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# **Tittabawassee River Sediment Dioxin/Furan Concentration Vertical Variability**

Prepared for  
**The Dow Chemical Company**

Midland, MI

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**CH2MHILL**

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# Acronyms and Abbreviations

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ASTM	American Society for Testing and Materials
CH2M HILL	CH2M HILL, Inc.
Dow	The Dow Chemical Company
EPA	U.S. Environmental Protection Agency when used with method (e.g., EPA Method 8260)
HSP	Health and Safety Plan
LTI	LimnoTech, Inc.
MDEQ	Michigan Department of Environmental Quality
MOCA	Midland Offsite Corrective Action
MS/MSD	matrix spike/matrix spike duplicate
Ppt	part(s) per trillion
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
TEQ	total toxic equivalent
TOC	total organic carbon
USCS	Unified Soil Classification System

# Sediment Dioxin/Furan Concentration Vertical Variability, Tittabawassee River

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## 1 Introduction

This document presents the results of the preliminary sediment sample analysis and sediment vertical variability evaluation conducted for The Dow Chemical Company (Dow) during the first quarter of 2005. The analysis and evaluation was conducted on cores collected from the Tittabawassee River in Fall 2003 and Summer 2004 and in accordance with the Tittabawassee River Sediment Vertical Characterization Sampling and Analysis Plan (SAP) (CH2M HILL, 2004a). The SAP is included as Attachment 1.

This report documents the data collected and presents results of the sample analysis and sediment vertical variability evaluation to provide a preliminary assessment of sediment conditions. The contents of this report include a discussion of:

- Previous field activities associated with core collection (Section 2)
- Summary of sampling activities (Section 3)
- Laboratory analysis of sediment samples (Section 4)
- Summary of the analytical validation (Section 5)
- A discussion of the analytical results (Section 6)
- A discussion of the data evaluation (Section 7)
- Detailed tabular information on the sample stations and cores collected (Appendix A)
- Detailed information on the analytical validation (Appendix B)
- All dioxin and furan congener-specific results (Appendix C)
- A statistical evaluation of the data (Appendix D)

## 2 Summary of Previous Sediment Sampling Activities

Sediment samples for this study were taken from sediment cores previously collected in two phases from the Tittabawassee River. Figure 1 presents a map of locations where sediment cores were collected. Field data collected for each of the sediment core locations are presented in Appendix A, Tables A-1 and A-4. The following briefly discusses the sediment core collection and sampling activities for both phases.

### 2.1 2003 Sediment Sampling

In November and December 2003, sediment cores were collected from the Tittabawassee River as part of the Poling and Coring Study for Characterization of Sediment Type and Thickness of Unconsolidated Deposits (LTI, 2004). The objectives of the study were to improve the understanding of solids deposition and transport through the river system and provide preliminary data supporting an assessment of the stability of river and floodplain sediments. This study included the collection of 23 sediment cores during November and

December 2003. The sediment cores were collected from a subset of probe locations that were measured during the Tittabawassee River probing study. The 23 sediment cores were collected at approximately 1-mile intervals, with an even distribution of center, left, and right channel samples to be representative of the length of the river downstream of Dow Midland facility, and the entire width of the river channel.

Following their collection, the 23 sediment cores were maintained and frozen in a vertical position at the LimnoTech, Inc. (LTI) facility in Ann Arbor, Michigan. In the spring of 2004, samples were collected for dioxin and furan analysis from the upper 0.3 feet of each core, as described in the Sampling and Analysis Plan. The results of the laboratory analysis were reported in the Tittabawassee River Sediment Dioxin/Furan Concentration Variability report (CH2M HILL, 2005). The remainder of each sediment core was maintained in frozen storage.

Sediment dioxin/furan concentrations from this sampling event ranged from 2 to 9,300 parts per trillion (ppt) TEQ. Two samples from this data set were of particular interest due to reported TEQs that were substantially higher than the other samples. These included samples SHL-02235 and THT-02245, which showed concentrations of 2,900 and 9,300 ppt TEQ, respectively. Sample SHL-02235 was collected approximately 1,000 feet upstream of the Saginaw Township WWTP outfall and THT-02245 was collected in the vicinity of Imerman Park. Note, however, that a second sample collected from the same location as THT-02245 at a later date showed a dioxin/furan concentration of 260 ppt TEQ.

The two surface sediment samples collected during the 2003 event that exhibited significantly higher total toxic equivalent (TEQ) concentrations (THT-02245 and SHL-02235) than other samples collected during this period became the focal point for the design of the summer of 2004 sediment sampling event.

## 2.2 2004 Sediment Sampling

The objective of the 2004 sampling event was to collect sufficient data to conduct a preliminary evaluation of the surface sediment variability in the two areas of elevated dioxins/furans measured in the sediment collected from the Tittabawassee River in 2003. To meet this objective, a series of sediment cores were collected at logarithmically increasing distances (approximately 3, 30, 100, 330, and 980 feet) from the sample location with the elevated concentration. Sample analysis was designed to be implemented in phases, with results from the samples closest to locations with elevated concentrations evaluated prior to determining which (if any) additional samples would be analyzed.

In July 2004, sediment cores were collected from the Tittabawassee River as part of the Sediment Dioxin/Furan Concentration Variability report (CH2M HILL, 2005). This effort included the collection of 35 sediment cores of varying length, but no greater than 5 feet, in accordance with the Core Sediment Sampling Field Standard Operating Procedure (SOP) (CH2M HILL, 2004b).

Following their collection, all sediment cores were maintained and frozen in a vertical position at the CH2M HILL facility in Midland, Michigan. Samples were then collected for dioxin and furan analysis from the upper 0.3 feet of 13 cores as described in the SAP. The results of the laboratory analysis were reported in the Tittabawassee River Sediment

Dioxin/Furan Concentration Variability report (CH2M HILL, 2005). The remaining portions of these cores, as well as the cores from which no samples were taken, were placed in and remain in frozen storage.

In fall 2003, the sediment sample collected from THT-02245 had a TEQ value of 9,300 ppt. In the samples collected near this location in the summer of 2004, TEQ values ranged from 10 to 71 ppt. TEQ values ranged from 15 to 520 ppt in the area surrounding SHL-02235 in samples collected in 2004. As noted above, the sample collected from location SHL-02235 had a calculated TEQ of 2,900 ppt.

Three samples were analyzed in the vicinity of the Saginaw Township WWTP to evaluate potential impacts of the effluent on sediment dioxin/furan concentrations. Sample SHL-02818 located upstream of the WWTP had a TEQ concentration of 610 ppt, sample SHL-02817 located adjacent to the WWTP had a TEQ concentration of 32 ppt, and sample SHL-02816 located downstream of the WWTP had a TEQ concentration of 40 ppt.

## 3 Summary of Sample Analysis Activities

### 3.1 Sample Analysis Design

The objective of this sample analysis event was to develop a preliminary understanding of the vertical distribution of dioxins and furans in Tittabawassee River sediments by analyzing samples from existing sediment cores collected in the fall of 2003 and in the summer of 2004. In order to vertically characterize the sediments, the following intervals were identified for dioxin and furan analysis:

- Surface Sediment: 0 to 0.3 ft
- Subsurface Sediment: bottom 1 ft of each core

Consistent with previous Tittabawassee River sediment studies (LTI, 2004; CH2M HILL, 2005), the 0.0 to 0.3 ft interval was selected for analysis of surface sediments. The surface sediment sample interval in each 2003 core and a portion of cores from the 2004 event was previously analyzed for dioxins and furans. The bottom 1-foot subsurface sediment sample interval was selected because it brackets the lowermost available interval of sediment. Additional details of the sampling design are included in the SAP.

### 3.2 Lithology Assessment and Sample Preparation

The existing sediment cores collected in 2003 and 2004 and preserved in frozen storage were thawed in a vertical position prior to lithology assessment and sample processing in January 2005. The lithology of each sediment core was assessed using the Unified Soil Classification System (USCS) (ASTM D2488-00).

Samples were obtained from existing sediment cores and prepared for analysis in accordance with the SAP, the Quality Assurance Project Plan (QAPP) (CH2M HILL, 2004c), and the Dow MOCA Health, Safety, and Environment Plan (HSP) (CH2M HILL, 2003).

Sediment samples from the 0.0- to 0.3-foot interval of the 2004 cores and the bottom foot of all 2003 and 2004 cores were each sectioned using a hacksaw, homogenized, and placed in appropriate sample containers for shipment to the laboratories for grain size, dioxin/furan,

and TOC analysis. The remaining portions of the sediment cores were returned to frozen storage at the LTI and CH2M HILL facilities.

A total of 50 samples (36 surface and 14 subsurface sediment samples) were collected and sent to Alta Laboratories and Gulf Coast Analytical Laboratories (reference Section 4.0). The station identification numbers (Station IDs), location coordinates, sample identification numbers (Sample IDs), sample depth intervals, and associated analytical batches are summarized in Tables A-2 and A-5. Quality control samples were collected in accordance with the QAPP. As part of the chemical analysis sampling, four field duplicates, three matrix spike/matrix spike duplicates, and one equipment blank were collected. Tables A-3 and A-6 of Appendix A summarize the QC sample type, event frequency, and QAPP specified frequency for QC sample collection.

## 4 Laboratory Analysis

The samples collected from the sediment cores were labeled, packaged, and shipped to the appropriate laboratory in accordance with the Sample Handling and Shipping Custody Procedures Field SOP. Sediment samples were analyzed for dioxins/furans, total organic carbon (TOC), and grain size in January 2005 in accordance with the QAPP.

All dioxin and furan analyses were preformed at Alta Analytical Laboratory in El Dorado Hills, California. Samples were analyzed for all 17 of the 2, 3, 7, 8-substituted dioxin and furan congeners using Environmental Protection Agency (EPA) Method 8290.

Analyses for TOC and grain size were performed at Gulf Coast Analytical Labs in Baton Rouge, Louisiana. TOC and grain size, as stated in the SAP, were analyzed using EPA Method 415.1 and American Society for Testing and Materials (ASTM) Method D422, respectively.

## 5 Validation

Analytical data from the sediment sampling event was validated to Level III by CH2M HILL chemists. The overall evaluation of the data indicates that the sample handling, shipment, and analytical procedures have been adequately completed. The validation review demonstrated that the analytical systems were generally in control and that the data results, except in those cases where they have been qualified, can be used. The complete validation summary report is provided in Appendix B.

## 6 Summary of Analytical Data

The sediment samples processed in early January 2005 were analyzed for dioxin/furan, TOC, and/or grain size in late January 2005. Analytical results for all 17 dioxin/furan congeners are presented in Appendix C, Tables C-1 and C-2.

Dioxin/furan data was used to calculate TEQ for each sample interval analyzed. TEQs are calculated according to World Health Organization methodology (Van den Berg, et al., 1998), using toxicity equivalency factors for mammals. Laboratory non-detect results for individual congeners were factored into the TEQ calculation using a value of one-half the

laboratory detection limit in accordance with the Approaches for Evaluation of Dioxin/Furan Analytical Data for Use in Calculating Toxicity Equivalent to 2,3,7,8-TCDD (TEQ) SOP (CH2M HILL, 2004d).

Table 1 presents the TEQ data used for the sediment vertical variability evaluation and only includes TEQ results from those sediment core locations where both surface and sub-surface samples were analyzed for dioxins/furans. There are 78 samples within paired surface and subsurface sample data sets resulting in 39 paired sets of samples. Sample date, location, and depth intervals are also included in Table 1.

In addition to samples obtained in January 2005 for this study, Table 1 includes sample analyses previously reported by Michigan Department of Environmental Quality (MDEQ) in August 2002 and by Dow in March 2005. TEQ results were reported in the Baseline Chemical Characterization of Saginaw Bay Watershed Sediments (MDEQ, 2002) and in the Tittabawassee River Sediment Dioxin/Furan Concentration Variability report (CH2M HILL, 2005). Sample locations and corresponding TEQ results are shown in Figures 2, 2A, and 2B. Figure 2 provides a core location overview and Figures 2A and 2B presents core locations in the areas around the two elevated TEQ sample locations discovered in 2003.

The data sets of surface and sub-surface interval dioxin and furan concentrations reported as TEQ in parts per trillion (ppt) have the following characteristics:

	Surface Samples	Sub-surface Samples
<b>Range</b>	4.5 to 4,500 ppt	0.14 to 19,000 ppt
<b>Mean</b>	310 ppt	650 ppt
<b>Median</b>	28 ppt	10 ppt
<b>Standard Deviation</b>	830 ppt	3,200 ppt
<b>Variance</b>	$6.9 \times 10^5$ ppt	$1.0 \times 10^7$ ppt

Further evaluation of the TEQ data results is presented in Section 7.

Results of the TOC analysis are presented in Table 2. TOC concentrations ranged from non-detect to 43,400 mg/kg.

Results of the grain size analysis are summarized and presented in Table 3. The grain size sieve analyses are presented in Appendix D. The Unified Soil Classification System (ASTM D2488-00) was applied to the grain size results to classify the lithology of the sediment samples. The vast majority of the samples (86 percent) had sand-dominated lithologies (72 percent sand and 14 percent sand with gravel). The remaining samples were either silty sand/sand with silt (8 percent) or silt/sandy silt (6 percent) dominant. Locations where samples were taken at the river-sediment surface and at depth showed an even split between having sand throughout the entire interval and a progression of coarse to finer lithologies with depth (e.g., sand with gravel to sand at depth, or sand to silty sand at depth). Four duplicate samples were taken, and each duplicate sample yielded the same lithology as the original sample.

## 7 Data Evaluation

The vertical distribution of dioxin and furan concentrations in sediments were characterized by collecting paired samples from surface sediments (0 to 0.3 ft) and subsurface sediments (bottom 1 ft in the core). Statistical analyses were conducted of the surface and subsurface groups to evaluate differences in concentrations between shallow and deep sediment samples. The subsurface sediment sample intervals were variable; the bottom depths of the intervals ranged from 0.75 to 5 feet. The subsurface intervals are listed in Table 1 and the depths at the bottom of the intervals are shown in Figure 3.

A statistical evaluation, using both parametric t-test and nonparametric MannWhitney U-test, of surface samples compared to deeper sediment samples was completed at 39 locations where both shallow and deep samples were available for analysis. Upon comparison of the TEQ results for each core interval to each other, vertically there is a tendency for higher TEQ concentrations in surface sediments compared to deeper intervals with median values of 33 and 10 ppt TEQ, respectively. However, the highest reported concentration of 19,000 ppt TEQ was reported from a deeper sample interval of 2.9 to 3.9 ft. Although the highest reported concentration was detected in a deeper sample, a statistical evaluation of the data set presented in Appendix E notes that concentrations in surface and subsurface samples are significantly different. Concentrations in surface sediment are likely to more consistently be higher than those in subsurface sediment over the sample area. Figure 3 provides graphs of the vertical profile along the Tittabawassee River. Appendix E contains the full statistical evaluation of these data.

## 8 References

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- CH2M HILL. 2004b. *Core Sediment Sampling Field SOP*
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## **Tables**

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TABLE 1

TEQs in Sediment, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*  
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Location ID	Field Sample ID	Depth (ft)	Sample Date	Analysis Date	TEQ Result <sup>1</sup> (ng/kg)
FRE-02247	120803-SED-02247-00.3	0-0.3	12/8/2003	4/26/2004	490
FRE-02247	120803-SED-02247-03.40	2.4-3.4	12/8/2003	2/2/2005	13
FRE-02248	120803-SED-02248-00.3	0-0.3	12/8/2003	4/22/2004	11
FRE-02248	120803-SED-02248-00.75	0-0.75	12/8/2003	2/2/2005	7.1
FRE-02249	120903-SED-02249-00.3	0-0.3	12/9/2003	4/23/2004	11
FRE-02249	120903-SED-02249-04.10	3.1-4.1	12/9/2003	2/3/2005	28
FRE-02250	111403-SED-02250-00.3	0-0.3	11/14/2003	4/26/2004	16
FRE-02250	111403-SED-02250-02.30	1.25-2.25	11/14/2003	2/2/2005	8.0
MIC-02251	111703-SED-02251-00.3	0-0.3	11/17/2003	4/23/2004	12
MIC-02251	111703-SED-02251-02.50	1.5-2.5	11/17/2003	2/5/2005	1300
MIC-02252	120903-SED-02252-00.3	0-0.3	12/9/2003	4/23/2004	6.7
MIC-02252	120903-SED-02252-02.30	1.3-2.3	12/9/2003	2/5/2005	10
SHI-02232	112403-SED-02232-00.3	0-0.3	11/24/2003	4/26/2004	60
SHI-02232	112403-SED-02232-03.70	2.67-3.67	11/24/2003	2/2/2005	0.31
SHL-02233	112503-SED-02233-00.3	0-0.3	11/25/2003	4/23/2004	18
SHL-02233	112503-SED-02233-03.90	2.9-3.9	11/25/2003	2/5/2005	19000
SHL-02234	112603-SED-02234-00.3	0-0.3	11/26/2003	4/26/2004	6.7
SHL-02234	110603-SED-02234-01.50	0.5-1.5	11/6/2003	2/2/2005	12
SHL-02235	112603-SED-02235-00.3	0-0.3	11/26/2003	4/26/2004	2900
SHL-02235	112603-SED-02235-02.40	1.42-2.42	11/26/2003	2/2/2005	120
SHL-02236	110703-SED-02236-00.3	0-0.3	11/7/2003	4/22/2004	16
SHL-02236	110703-SED-02236-02.00	1-2	11/7/2003	2/3/2005	23
SHL-02237	120103-SED-02237-00.3	0-0.3	12/1/2003	4/23/2004	25
SHL-02237	120103-SED-02237-03.00	2-3	12/1/2003	2/3/2005	0.14
SHL-02238	110703-SED-02238-00.3	0-0.3	11/7/2003	4/21/2004	37
SHL-02238	110703-SED-02238-01.60	0.58-1.58	11/7/2003	2/3/2005	31
SHL-02239	120203-SED-02239-00.3	0-0.3	12/2/2003	4/26/2004	490
SHL-02239	120203-SED-02239-04.00	3-4	12/2/2003	2/2/2005	0.31
SHL-02240	120203-SED-02240-00.3	0-0.3	12/2/2003	4/26/2004	6.6
SHL-02240	120203-SED-02240-01.80	0.8-1.8	12/2/2003	2/5/2005	0.98
SHL-02788	070904-SED-02788-00.30	0-0.3	7/9/2004	1/26/2005	4500
SHL-02788	070904-SED-02788-02.40	1.4-2.4	7/9/2004	1/26/2005	3.3
SHL-02789	070904-SED-02789-00.30	0-0.3	7/9/2004	1/27/2005	43
SHL-02789	070904-SED-02789-02.00	1-2	7/9/2004	1/27/2005	87
SHL-02790	070904-SED-02790-00.30	0-0.3	7/9/2004	1/27/2005	4.5
SHL-02790	070904-SED-02790-05.00	4-5	7/9/2004	1/27/2005	8.1
SHL-02797	070704-SED-02797-00.30	0-0.3	7/7/2004	1/28/2005	890
SHL-02797	070704-SED-02797-03.60	2.6-3.6	7/7/2004	1/28/2005	0.89
SHL-02801	070704-SED-02801-00.30	0-0.3	7/7/2004	1/28/2005	7.6
SHL-02801	070704-SED-02801-03.25	2.25-3.25	7/7/2004	1/28/2005	0.39
SHL-02802	070704-SED-02802-00.30	0-0.3	7/7/2004	1/28/2005	8.9
SHL-02802	070704-SED-02802-02.75	1.75-2.75	7/7/2004	2/5/2005	0.99
SHL-02817	070904-SED-02817-00.30	0-0.3	7/9/2004	7/23/2004	32
SHL-02817	070904-SED-02817-03.00	2-3	7/9/2004	1/27/2005	9.2
THT-02241	120303-SED-02241-00.3	0-0.3	12/3/2003	4/22/2004	120
THT-02241	120303-SED-02241-02.30	1.3-2.3	12/3/2003	2/5/2005	22
THT-02242	120303-SED-02242-00.3	0-0.3	12/3/2003	4/26/2004	44
THT-02242	120303-SED-02242-03.90	2.9-3.9	12/3/2003	2/3/2005	0.16

TABLE 1

TEQs in Sediment, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*  
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Location ID	Field Sample ID	Depth (ft)	Sample Date	Analysis Date	TEQ Result <sup>1</sup> (ng/kg)
THT-02243	120403-SED-02243-00.3	0-0.3	12/4/2003	4/21/2004	9.2
THT-02243	120403-SED-02243-03.00	2-3	12/4/2003	2/3/2005	2.1
THT-02244	120403-SED-02244-00.3	0-0.3	12/4/2003	4/26/2004	270
THT-02244	120403-SED-02244-03.80	2.8-3.8	12/4/2003	2/5/2005	190
THT-02246	120503-SED-02246-00.3	0-0.3	12/5/2003	4/21/2004	140
THT-02246	120503-SED-02246-03.00	2-3	12/5/2003	2/3/2005	0.14
THT-02783	070104-SED-02783-00.30	0-0.3	7/1/2004	1/28/2005	19
THT-02783	070104-SED-02783-03.40	2.4-3.4	7/1/2004	1/28/2005	13
THT-02784	070104-SED-02784-00.30	0-0.3	7/1/2004	1/29/2005	14
THT-02784	070104-SED-02784-03.55	2.55-3.55	7/1/2004	1/29/2005	140
THT-02785	070104-SED-02785-00.30	0-0.3	7/1/2004	1/29/2005	1100
THT-02785	070104-SED-02785-01.80	0.8-1.8	7/1/2004	1/29/2005	99
THT-02786	070104-SED-02786-00.30	0-0.3	7/1/2004	1/29/2005	6.3
THT-02786	070104-SED-02786-01.50	0.5-1.5	7/1/2004	2/2/2005	0.47
THT-02772	070204-SED-02772-00.30	0-0.3	7/2/2004	1/26/2005	12
THT-02772	070204-SED-02772-04.00	3-4	7/2/2004	1/26/2005	0.23
THT-02773	070204-SED-02773-00.30	0-0.3	7/2/2004	1/26/2005	800
THT-02773	070204-SED-02773-04.90	3.9-4.9	7/2/2004	1/26/2005	9.9
THT-02774	070204-SED-02774-00.30	0-0.3	7/2/2004	1/26/2005	15
THT-02774	070204-SED-02774-02.85	1.85-2.85	7/2/2004	1/26/2005	8.1
01DEQ-020 <sup>2</sup>	01DEQ-020-SED-0020	0.33-1.00	8/30/2001	8/30/2001	15
01DEQ-020 <sup>2</sup>	01DEQ-020-SED-0021	0.00-0.17	8/30/2001	8/30/2001	33
01DEQ-021 <sup>2</sup>	01DEQ-021-SED-0022	0.33-1.00	8/31/2001	8/31/2001	50
01DEQ-021 <sup>2</sup>	01DEQ-021-SED-0023	0.00-0.17	8/31/2001	8/31/2001	150
01DEQ-022 <sup>2</sup>	01DEQ-022-SED-0024	0.33-1.00	9/4/2001	9/4/2001	13
01DEQ-022 <sup>2</sup>	01DEQ-022-SED-0025	0.00-0.17	9/5/2001	9/5/2001	59
01DEQ-023 <sup>2</sup>	01DEQ-023-SED-0026	0.33-1.00	9/5/2001	9/5/2001	2000
01DEQ-023 <sup>2</sup>	01DEQ-023-SED-0027	0.00-0.17	9/5/2001	9/5/2001	89
01DEQ-025 <sup>2</sup>	01DEQ-025-SED-0030	0.33-1.00	10/19/2001	10/19/2001	350
01DEQ-025 <sup>2</sup>	01DEQ-025-SED-0032	0.00-0.17	10/19/2001	10/19/2001	540

Note:

<sup>1</sup> Results are rounded to two significant figures.<sup>2</sup> Samples were collected by the Michigan Department of Environmental Quality. Data was presented in the MDEQ 2001 Baseline Report (MDEQ, 2002)

TABLE 2

Total Organic Carbon in Sediment, Vertical Variability

*Dow MOCA—Tittabawassee River Sediment*

(Page 1 of 2)

<b>Location ID</b>	<b>Field Sample ID</b>	<b>Depth (ft)</b>	<b>TOC Result (mg/kg)*</b>
FRE-02247	120803-SED-02247-03.40	2.4-3.4	100
FRE-02248	120803-SED-02248-00.75	0-0.75	5417
FRE-02249	120903-SED-02249-04.10	3.1-4.1	100
FRE-02250	111403-SED-02250-02.30	1.25-2.25	100
MIC-02251	111703-SED-02251-02.50	1.5-2.5	41630
MIC-02252	120903-SED-02252-02.30	1.3-2.3	100
SHI-02232	112403-SED-02232-03.70	2.67-3.67	100
SHL-02233	112503-SED-02233-03.90	2.9-3.9	100
SHL-02234	110603-SED-02234-01.50	0.5-1.5	100
SHL-02235	112603-SED-02235-02.40	1.42-2.42	100
SHL-02236	110703-SED-02236-02.00	1-2	100
SHL-02237	120103-SED-02237-03.00	2-3	100
SHL-02238	110703-SED-02238-01.60	0.58-1.58	1757
SHL-02239	120203-SED-02239-04.00	3-4	100
SHL-02240	120203-SED-02240-01.80	0.8-1.8	7707
THT-02241	120303-SED-02241-02.30	1.3-2.3	100
THT-02242	120303-SED-02242-03.90	2.9-3.9	100
THT-02243	120403-SED-02243-03.00	2-3	2258
THT-02244	120403-SED-02244-03.80	2.8-3.8	100
THT-02246	120503-SED-02246-03.00	2-3	100
SHL-02788	070904-SED-02788-02.40	1.4-2.4	43400
SHL-02788	070904-SED-02788-00.30	0-0.3	100
SHL-02789	070904-SED-02789-02.00	1-2	100
SHL-02789	070904-SED-02789-00.30	0-0.3	100
SHL-02790	070904-SED-02790-05.00	4-5	100
SHL-02790	070904-SED-02790-00.30	0-0.3	100
SHL-02797	070704-SED-02797-03.60	2.6-3.6	1080
SHL-02797	070704-SED-02797-00.30	0-0.3	100
SHL-02801	070704-SED-02801-03.25	2.25-3.25	100
SHL-02801	070704-SED-02801-00.30	0-0.3	100
SHL-02802	070704-SED-02802-02.75	1.75-2.75	12572
SHL-02802	070704-SED-02802-00.30	0-0.3	100
SHL-02817	070904-SED-02817-03.00	2-3	100
SHL-02817	070904-SED-02817-00.30	0-0.3	100
THT-02772	070204-SED-02772-04.00	3-4	100
THT-02772	070204-SED-02772-00.30	0-0.3	100
THT-02773	070204-SED-02773-04.90	3.9-4.9	100
THT-02773	070204-SED-02773-00.30	0-0.3	17872
THT-02774	070204-SED-02774-00.30	0-0.3	100
THT-02774	070204-SED-02774-02.85	1.85-2.85	100
THT-02783	070104-SED-02783-00.30	0-0.3	100
THT-02783	070104-SED-02783-03.40	2.4-3.4	100
THT-02784	070104-SED-02784-03.55	2.55-3.55	100
THT-02784	070104-SED-02784-00.30	0-0.3	100
THT-02785	070104-SED-02785-01.80	0.8-1.8	1717

**TABLE 2**

Total Organic Carbon in Sediment, Vertical Variability

*Dow MOCA—Tittabawassee River Sediment*

(Page 2 of 2)

<b>Location ID</b>	<b>Field Sample ID</b>	<b>Depth (ft)</b>	<b>TOC Result (mg/kg)*</b>
THT-02785	070104-SED-02785-00.30	0-0.3	100
THT-02786	070104-SED-02786-01.50	0.5-1.5	7059
THT-02786	070104-SED-02786-00.30	0-0.3	100

Note:

\* A result of 100 mg/kg indicates that TOC was not detected in the sample.

100 mg/kg is the method detection limit.

TABLE 3

Grain Size in Sediment, Vertical Variability  
*Dow MOCA—Tittabawassee River Sediment*

Location ID	Field Sample ID	Depth (ft)	Grain Size Results (percent)				Particle Size Classification*
			<0.005 (mm) -- clay	0.005-0.075 (mm) - silt	0.075 - 5 (mm) -- sand	5 - 50 (mm) -- gravel	
THT-02783	070104-SED-02783-00.30	0-0.3	0	0	97.2	13	Sand
THT-02783	070104-SED-02783-03.40	2.4-3.4	0	0	93.7	4.8	Sand
THT-02784	070104-SED-02784-00.30	0-0.3	0	0	98.5	0.1	Sand
THT-02784	070104-SED-02784-03.55	2.55-3.55	0	0	95	3.3	Sand
THT-02785	070104-SED-02785-00.30	0-0.3	0	0	96.7	1.9	Sand
THT-02785	070104-SED-02785-01.80	0.8-1.8	0	0	94.2	4.3	Sand
THT-02786	070104-SED-02786-00.30	0-0.3	0	0	81.5	17.1	Sand with gravel
THT-02786	070104-SED-02786-01.50	0.5-1.5	21	59.8	18.9	0.3	Silt with sand
THT-02772	070204-SED-02772-00.30	0-0.3	0	0	82.3	16.4	Sand with gravel
THT-02772	070204-SED-02772-04.00	3-4	0	0	95.7	2.3	Sand
THT-02773	070204-SED-02773-00.30	0-0.3	0	0	66.5	32.6	Sand with gravel
THT-02773	070204-SED-02773-04.90	3.9-4.9	0	0	89.2	9.2	Sand
THT-02774	070204-SED-02774-00.30	0-0.3	0	0	96	2.6	Sand
THT-02774	070204-SED-02774-02.85	1.85-2.85	0	0	91.3	7.3	Sand
SHL-02797	070704-SED-02797-00.30	0-0.3	0	0	93.7	5	Sand
SHL-02797	070704-SED-02797-03.60	2.6-3.6	38.1	60	1.9	0	Silt
SHL-02801	070704-SED-02801-00.30	0-0.3	0	0	97.9	0.7	Sand
SHL-02801	070704-SED-02801-03.25	2.25-3.25	0	0	98.2	0.4	Sand
SHL-02802	070704-SED-02802-00.30	0-0.3	0	0	98.5	0	Sand
SHL-02802	070704-SED-02802-02.75	1.75-2.75	29.7	57.4	13	0	Silt
SHL-02788	070904-SED-02788-00.30	0-0.3	0	0	87.4	11.3	Sand
SHL-02788	070904-SED-02788-02.40	1.4-2.4	16.5	48.3	34.6	0.6	Sandy silt
SHL-02789	070904-SED-02789-00.30	0-0.3	0	0	89.3	9.4	Sand
SHL-02789	070904-SED-02789-02.00	1-2	16.5	67.2	15.4	0.8	Silt with sand
SHL-02790	070904-SED-02790-00.30	0-0.3	0	0	98	0.5	Sand
SHL-02790	070904-SED-02790-05.00	4-5	0	0	98.2	0	Sand
SHL-02817	070904-SED-02817-00.30	0-0.3	0	0	94.5	4	Sand
SHL-02817	070904-SED-02817-03.00	2-3	0	0	94.2	4.4	Sand
SHL-02234	110603-SED-02234-01.50	0.5-1.5	0	0	98.2	0	Sand
SHL-02236	110703-SED-02236-02.00	1-2	0	0	97	1.5	Sand
SHL-02238	110703-SED-02238-01.60	0.58-1.58	0	0	75.2	22.8	Sand with gravel
FRE-02250	111403-SED-02250-02.30	1.25-2.25	0	0	88.4	10.1	Sand
MIC-02251	111703-SED-02251-02.50	1.5-2.5	0	0	80	14.6	Sand
SHI-02232	112403-SED-02232-03.70	2.67-3.67	0	0	87.1	11.3	Sand
SHL-02233	112503-SED-02233-03.90	2.9-3.9	0	0	93.4	5.1	Sand
SHL-02235	112603-SED-02235-02.40	1.42-2.42	0	0	98.2	0	Sand
SHL-02237	120103-SED-02237-03.00	2-3	0	0	98.1	0	Sand
SHL-02239	120203-SED-02239-04.00	3-4	0	0	90.9	7.5	Sand
SHL-02240	120203-SED-02240-01.80	0.8-1.8	26.1	49.5	24.1	0.3	Silt with sand
THT-02241	120303-SED-02241-02.30	1.3-2.3	0	0	98.3	0.4	Sand

TABLE 3

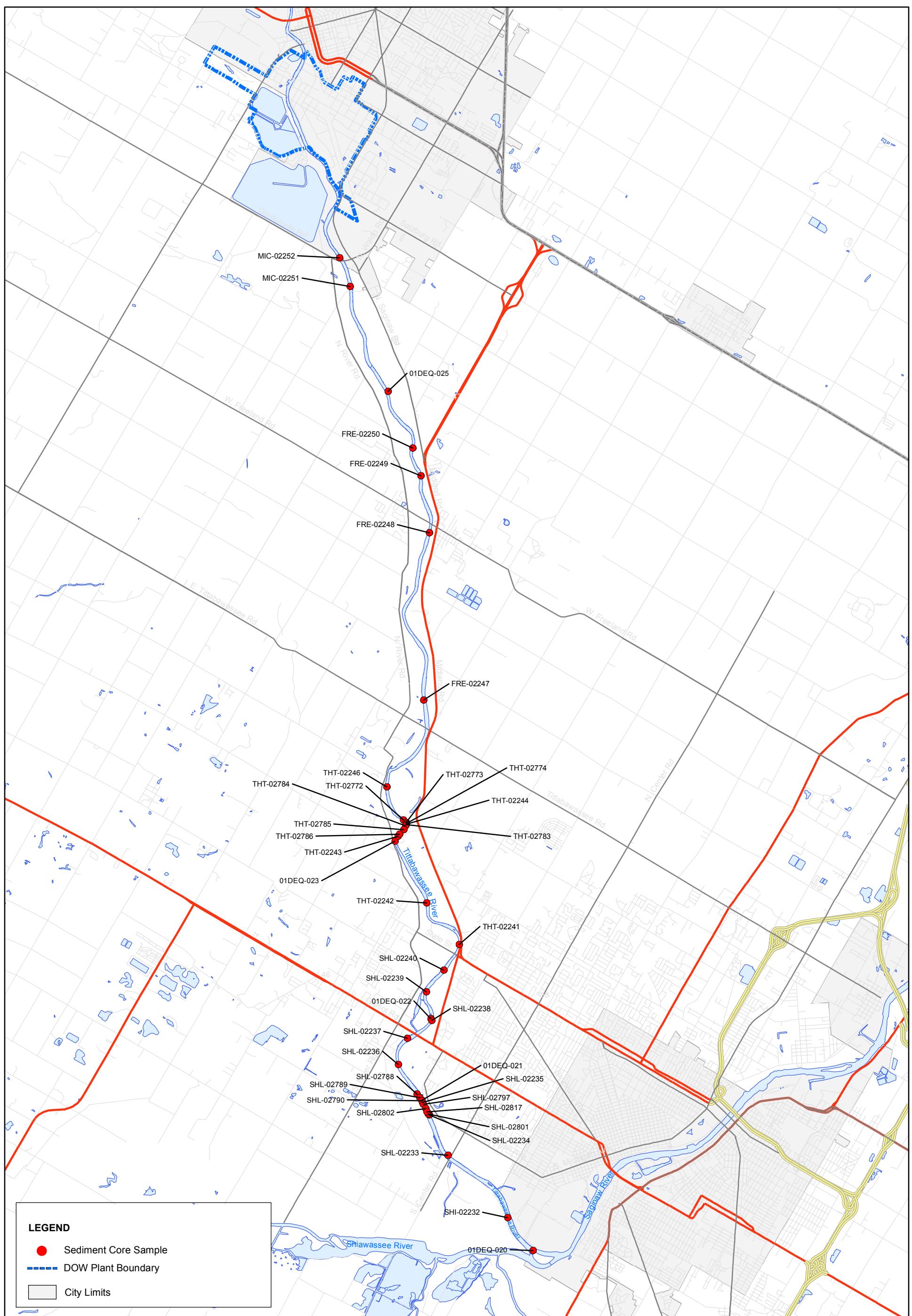
Grain Size in Sediment, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	Depth (ft)	Grain Size Results (percent)					Particle Size Classification*
			<0.005 (mm) -- clay	0.005-0.075 (mm) -- silt	0.075 - 5 (mm) -- sand	5 - 50 (mm) -- gravel		
THT-02242	120303-SED-02242-03.90	2.9-3.9	0	0	90	7.4	Sand	
THT-02243	120403-SED-02243-03.00	2-3	14.7	25.5	59.7	0.1	Silty sand	
THT-02244	120403-SED-02244-03.80	2.8-3.8	0	0	89.2	9.3	Sand	
THT-02246	120503-SED-02246-03.00	2-3	0	0	98.2	0.3	Sand	
FRE-02247	120803-SED-02247-03.40	2.4-3.4	0	0	93	5.5	Sand	
FRE-02248	120803-SED-02248-00.75	0-0.75	0	0	76.7	21	Sand with gravel	
FRE-02249	120903-SED-02249-04.10	3.1-4.1	0	0	95.9	0.8	Sand	
MIC-02252	120903-SED-02252-02.30	1.3-2.3	0	0	98	0.7	Sand	

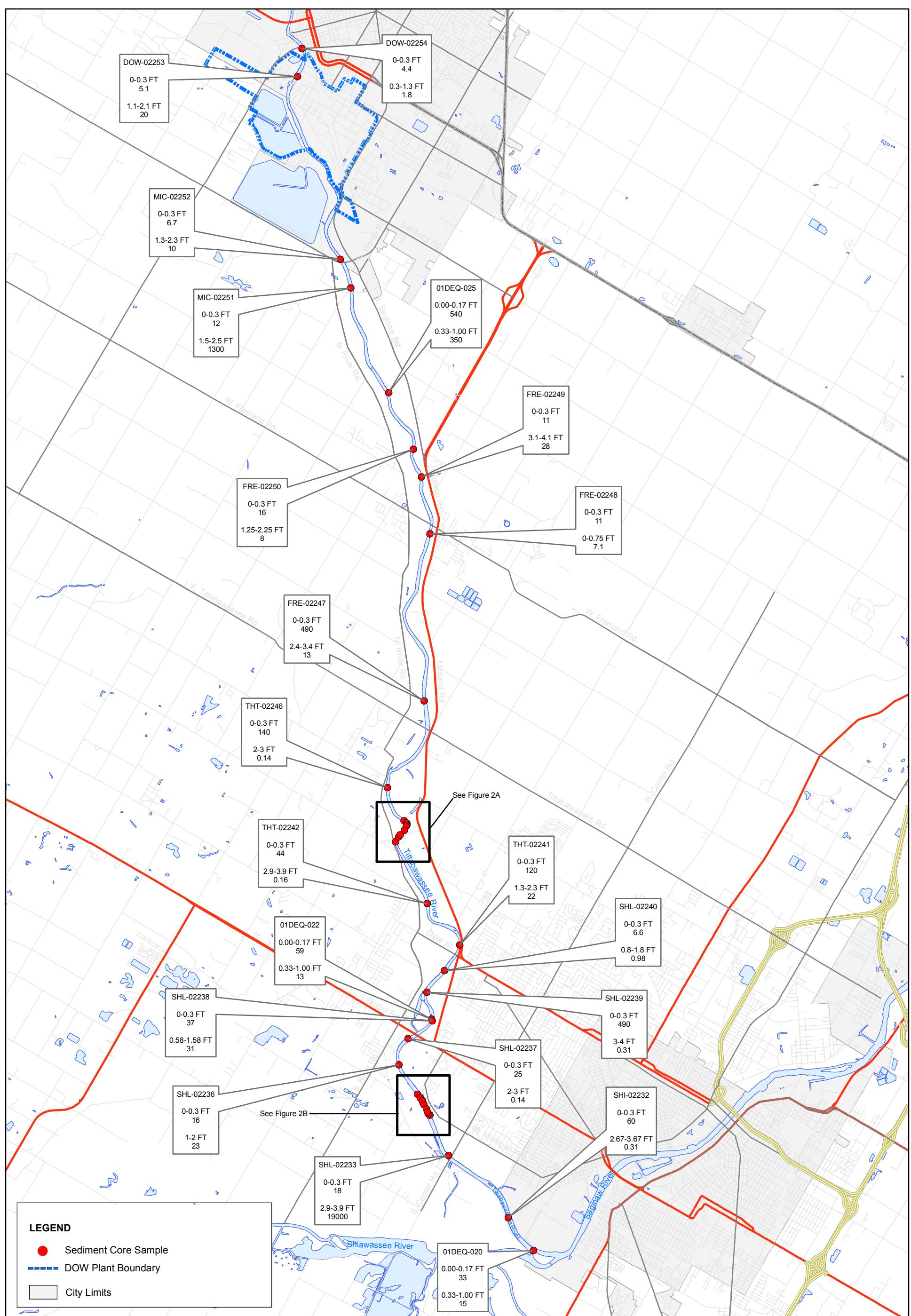
\*The Unified Soil Classification System (ASTM D2488-00) was used to classify the lithology of grain size results. Since the grain size analysis only records the particle size and not the sorting (e.g. - poorly sorted or well sorted), the sorting portion of the USCS sediment classification has been omitted.

## **Figures**

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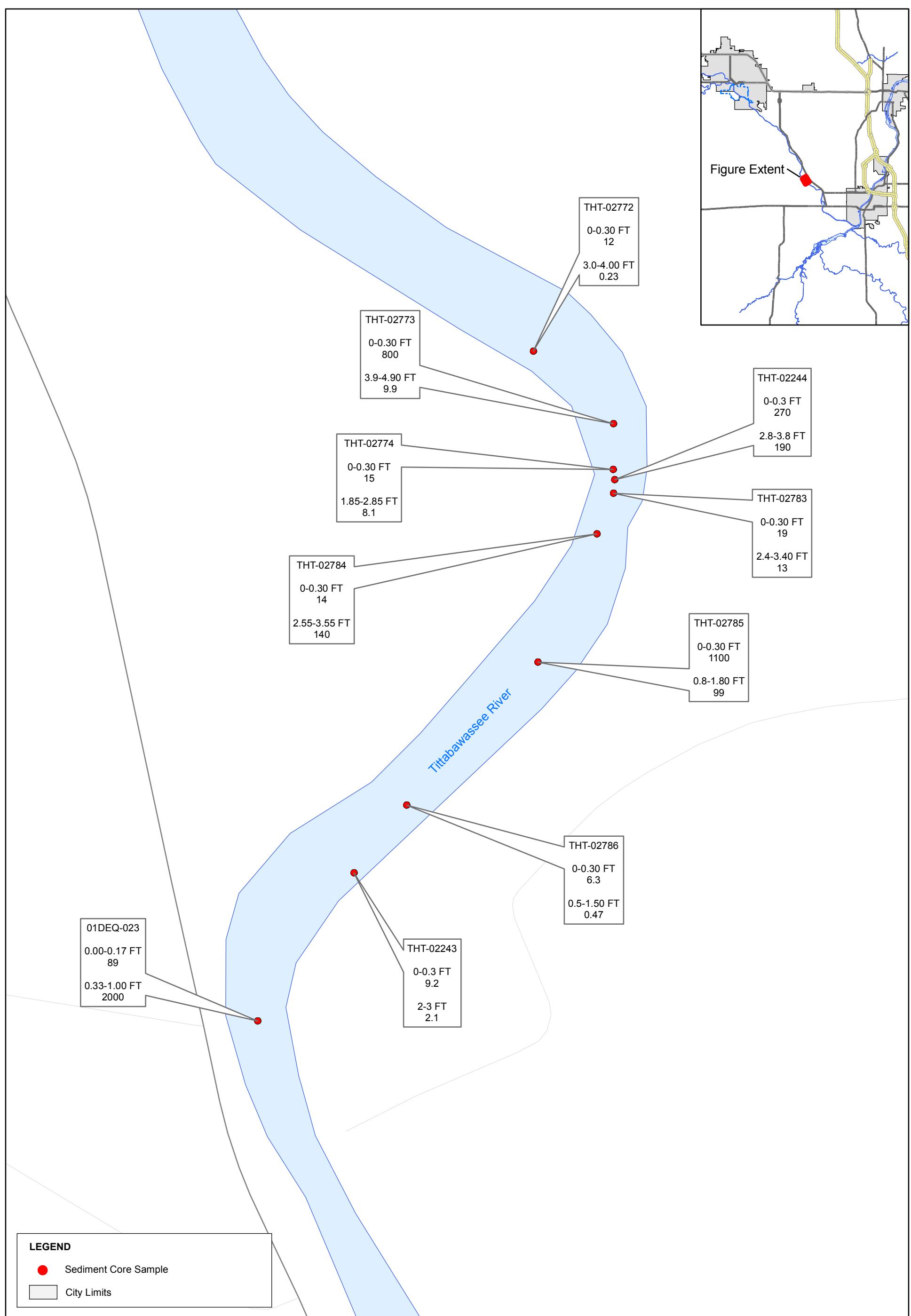


**FIGURE 1**  
Project Area - Sediment Core Locations Evaluated for Vertical Characterization  
*Tittabawasee River Sediment Vertical Variability*  
*DOW Midland Offsite Corrective Actions Program*



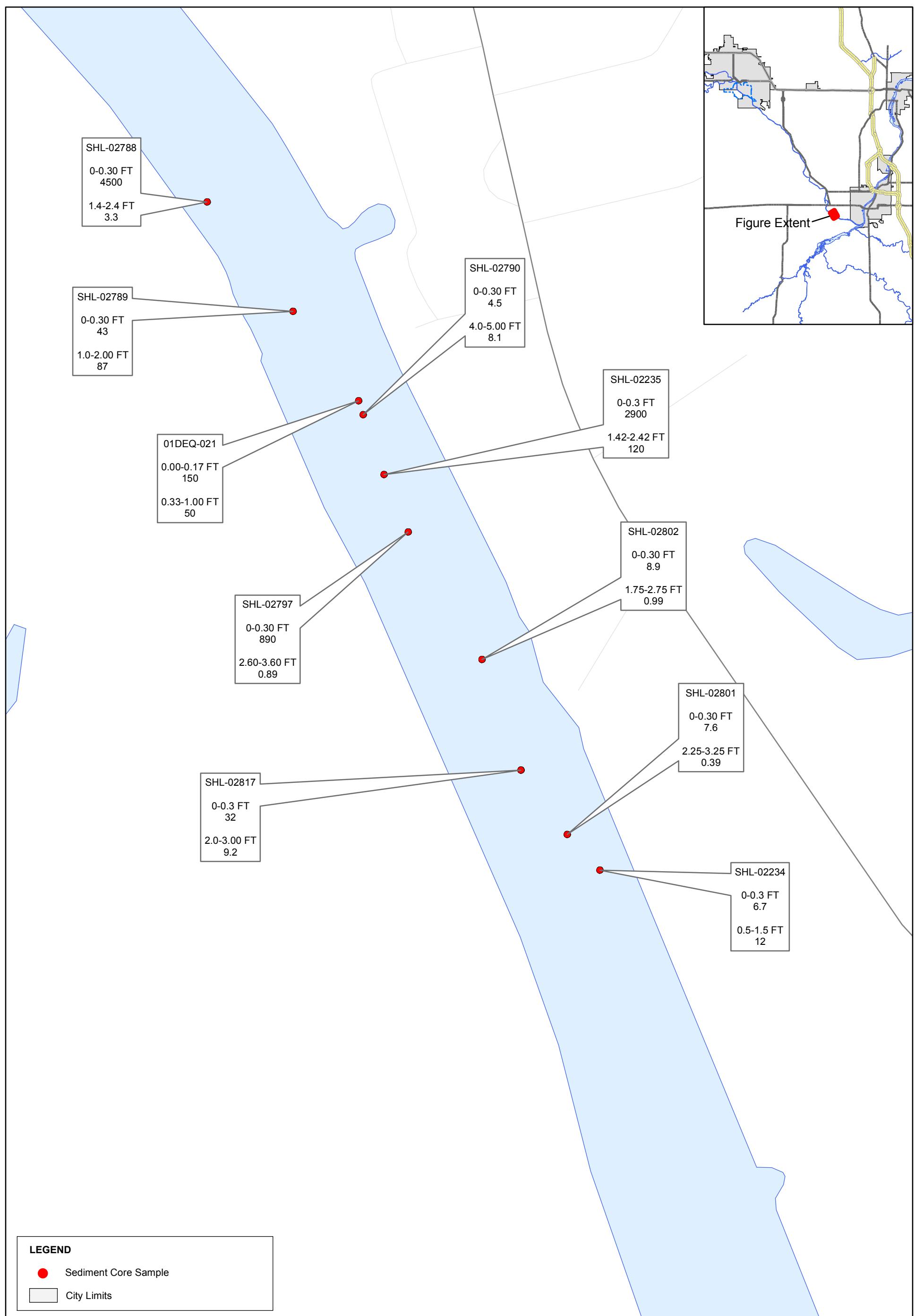
**FIGURE 2**  
Dioxin/Furan TEQ Results  
Tittabawassee River Sediment Vertical Variability  
DOW Midland Offsite Corrective Actions Program

**CH2MHILL**



**FIGURE 2A**  
Dioxin/Furan TEQ Results  
Tittabawasee River Sediment Vertical Variability  
DOW Midland Offsite Corrective Actions Program

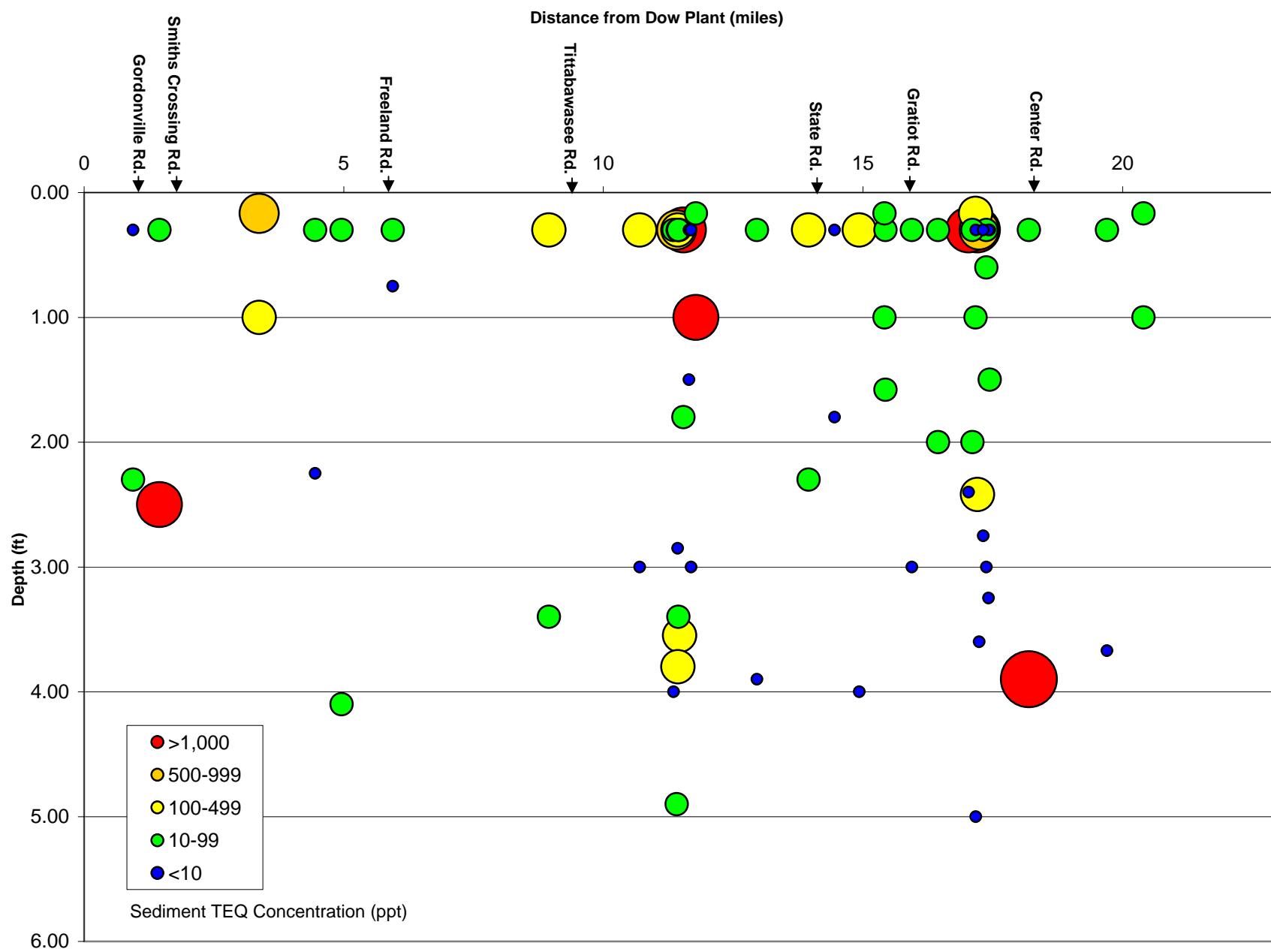
**CH2MHILL**



**FIGURE 2B**  
Dioxin/Furan TEQ Results  
Tittabawasee River Sediment Vertical Variability  
DOW Midland Offsite Corrective Actions Program

CH2MHILL

**Figure 3**  
Tittabawassee River Sediment TEQ Concentration vs Depth for Sample Locations with Multiple Depth Horizons Analyzed



**Appendix A**  
**Sediment Evaluation and**  
**Sample Summary**

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TABLE A-1  
Summary of Fall 2003 Field Measurements, Vertical Variability  
*Dow MOCA— Tittabawassee River Sediment Evaluation*

Station ID	Water Depth (ft)	Sediment Penetrated (ft)	Sediment Recovered (ft)
FRE-02247	3	NR	3.5
FRE-02248	5	NR	2.42
FRE-02249	7.5	NR	3
FRE-02250	4	NR	3
MIC-02251	8.5	NR	1.58
MIC-02252	2.5	NR	4
SHI-02232	3	NR	1.8
SHL-02233	7	NR	2.3
SHL-02234	3	NR	3.9
SHL-02235	3.75	NR	3
SHL-02236	0	NR	3.8
SHL-02237	2	NR	3
SHL-02238	3.75	NR	3
SHL-02239	3	NR	3.4
SHL-02240	5.5	NR	0.8
THT-02241	8	NR	4.1
THT-02242	4	NR	2.25
THT-02243	2	NR	1.58
THT-02244	4	NR	2.3
THT-02246	7.75	NR	1.3

NR = Not recorded. The sediment penetrated measurement was not recorded during the sampling events.

**TABLE A-2**

Fall 2003 Sample Station Summary, Vertical Variability  
*Dow MOCA—Tittabawassee River Sediment Evaluation*

<b>Station ID</b>	<b>Northing</b>	<b>Easting</b>	<b>Sample ID</b>	<b>Sample Depth Interval (ft.)</b>	<b>Analytical Batch</b>
FRE-02247	724241.55	13194571.5	120803-SED-02247-03.40	2.4-3.4	25657
FRE-02247	724241.55	13194571.5	120803-SED-02247-03.40	2.4-3.4	205012123
FRE-02247	724241.55	13194571.5	120803-SED-02247-03.40	2.4-3.4	205012124
FRE-02248	737309.16	13187602.1	120803-SED-02248-00.75	0-0.75	25657
FRE-02248	737309.16	13187602.1	120803-SED-02248-00.75	0-0.75	205012123
FRE-02248	737309.16	13187602.1	120803-SED-02248-00.75	0-0.75	205012124
FRE-02249	741301.33	13184435	120903-SED-02249-04.10	3.1-4.1	25657
FRE-02249	741301.33	13184435	120903-SED-02249-04.10	3.1-4.1	205012123
FRE-02249	741301.33	13184435	120903-SED-02249-04.10	3.1-4.1	205012124
FRE-02250	743063.61	13182577.9	111403-SED-02250-02.30	1.25-2.25	25657
FRE-02250	743063.61	13182577.9	111403-SED-02250-02.30	1.25-2.25	205012123
FRE-02250	743063.61	13182577.9	111403-SED-02250-02.30	1.25-2.25	205012124
MIC-02251	752677.30	13170630.6	111703-SED-02251-02.50	1.5-2.5	25657
MIC-02251	752677.30	13170630.6	111703-SED-02251-02.50	1.5-2.5	205012123
MIC-02251	752677.30	13170630.6	111703-SED-02251-02.50	1.5-2.5	205012124
MIC-02252	754393.72	13168563.5	120903-SED-02252-02.30	1.3-2.3	25657
MIC-02252	754393.72	13168563.5	120903-SED-02252-02.30	1.3-2.3	205012123
MIC-02252	754393.72	13168563.5	120903-SED-02252-02.30	1.3-2.3	205012124
SHI-02232	688304.70	13223920.8	112403-SED-02232-03.70	2.67-3.67	25657
SHI-02232	688304.70	13223920.8	112403-SED-02232-03.70	2.67-3.67	205012123
SHI-02232	688304.70	13223920.8	112403-SED-02232-03.70	2.67-3.67	205012124
SHL-02233	690433.69	13216565.9	112503-SED-02233-03.90	2.9-3.9	25657
SHL-02233	690433.69	13216565.9	112503-SED-02233-03.90	2.9-3.9	205012123
SHL-02233	690433.69	13216565.9	112503-SED-02233-03.90	2.9-3.9	205012124
SHL-02234	692700.00	13213354.3	110603-SED-02234-01.50	0.5-1.5	25657
SHL-02234	692700.00	13213354.3	110603-SED-02234-01.50	0.5-1.5	205012123
SHL-02234	692700.00	13213354.3	110603-SED-02234-01.50	0.5-1.5	205012124
SHL-02235	693347.10	13212293.1	112603-SED-02235-02.40	1.42-2.42	25657
SHL-02235	693347.10	13212293.1	112603-SED-02235-02.40	1.42-2.42	205012123
SHL-02235	693347.10	13212293.1	112603-SED-02235-02.40	1.42-2.42	205012124
SHL-02236	695191.58	13208752.6	110703-SED-02236-00.3	0-0.3	24910
SHL-02236	695191.58	13208752.6	110703-SED-02236-02.00	1-2	25657
SHL-02236	695191.58	13208752.6	110703-SED-02236-02.00	1-2	205012123
SHL-02236	695191.58	13208752.6	110703-SED-02236-02.00	1-2	205012124
SHL-02237	697605.92	13208282.3	120103-SED-02237-00.3	0-0.3	24910
SHL-02237	697605.92	13208282.3	120103-SED-02237-03.00	2-3	25657
SHL-02237	697605.92	13208282.3	120103-SED-02237-03.00	2-3	205012123
SHL-02237	697605.92	13208282.3	120103-SED-02237-03.00	2-3	205012124

**TABLE A-2**

Fall 2003 Sample Station Summary, Vertical Variability  
*Dow MOCA—Tittabawassee River Sediment Evaluation*

<b>Station ID</b>	<b>Northing</b>	<b>Easting</b>	<b>Sample ID</b>	<b>Sample Depth Interval (ft.)</b>	<b>Analytical Batch</b>
SHL-02238	700057.82	13209376.2	110703-SED-02238-01.60	0.58-1.58	25657
SHL-02238	700057.82	13209376.2	110703-SED-02238-01.60	0.58-1.58	205012123
SHL-02238	700057.82	13209376.2	110703-SED-02238-01.60	0.58-1.58	205012124
SHL-02239	702001.30	13207696.7	120203-SED-02239-04.00	3-4	25657
SHL-02239	702001.30	13207696.7	120203-SED-02239-04.00	3-4	205012123
SHL-02239	702001.30	13207696.7	120203-SED-02239-04.00	3-4	205012124
SHL-02240	704439.91	13208069.3	120203-SED-02240-01.80	0.8-1.8	25657
SHL-02240	704439.91	13208069.3	120203-SED-02240-01.80	0.8-1.8	205012123
SHL-02240	704439.91	13208069.3	120203-SED-02240-01.80	0.8-1.8	205012124
THT-02241	707072.83	13208110.7	120303-SED-02241-02.30	1.3-2.3	25657
THT-02241	707072.83	13208110.7	120303-SED-02241-02.30	1.3-2.3	205012123
THT-02241	707072.83	13208110.7	120303-SED-02241-02.30	1.3-2.3	205012124
THT-02242	708825.79	13203781.9	120303-SED-02242-03.90	2.9-3.9	25657
THT-02242	708825.79	13203781.9	120303-SED-02242-03.90	2.9-3.9	205012123
THT-02242	708825.79	13203781.9	120303-SED-02242-03.90	2.9-3.9	205012124
THT-02243	712652.28	13198629.7	120403-SED-02243-03.00	2-3	25657
THT-02243	712652.28	13198629.7	120403-SED-02243-03.00	2-3	205012123
THT-02243	712652.28	13198629.7	120403-SED-02243-03.00	2-3	205012124
THT-02244	713955.50	13198710.8	120403-SED-02244-03.80	2.8-3.8	25657
THT-02244	713955.50	13198710.8	120403-SED-02244-03.80	2.8-3.8	205012123
THT-02244	713955.50	13198710.8	120403-SED-02244-03.80	2.8-3.8	205012124
THT-02246	715954.52	13195597	120503-SED-02246-03.00	2-3	25657
THT-02246	715954.52	13195597	120503-SED-02246-03.00	2-3	205012123
THT-02246	715954.52	13195597	120503-SED-02246-03.00	2-3	205012124

**TABLE A-3**

Fall 2003 QC Sample Summary, Vertical Variability  
*Dow MOCA—Tittabawassee River Sediment Evaluation*

QC Sample Type	Number of QC Samples Collected	Actual Event Frequency <sup>1</sup>	MOCA QAPP-Specified Frequency <sup>1</sup>
Trip Blanks	0 <sup>2</sup>	One per cooler containing samples for VOC analysis	One per cooler containing samples for VOC analysis
Matrix Spikes/Matrix Spike Duplicates	2 <sup>3</sup>	4.17%	5.0%
Field Duplicates	6 <sup>4</sup>	12.5%	10%
Field Blanks	0 <sup>5</sup>	0%	One per source of water used for decontamination
Equipment Blanks	0	0%	5.0%

<sup>1</sup> Frequency requirements are program wide frequencies and requirements, if not met above, will be met on a program wide basis.

<sup>2</sup> Samples for VOC analysis were not collected as part of this sampling.

<sup>3</sup> One matrix spike/matrix spike duplicate (MS/MSD) was collected for dioxin/furan analysis. One MS/MSD was collected for TOC and grain-size analyses.

<sup>4</sup> Two field duplicates were collected for dioxin/furan analyses. Four field duplicates were collected for TOC and grain-size analyses.

<sup>5</sup> Not required since no equipment decontamination was performed.

TABLE A-4

Summary of Summer 2004 Field Measurements, Vertical Variability

*Dow MOCA—Tittabawassee River Sediment Evaluation*

<b>Station ID</b>	<b>Water Depth (ft)</b>	<b>Sediment Penetrated (ft)</b>	<b>Sediment Recovered (ft)</b>
SHL-02788	4	3	2.4
SHL-02789	3.75	2.5	2
SHL-02790	5	2.4	1.5
SHL-02797	4.25	3.5	3.6
SHL-02801	4.5	3.5	3.25
SHL-02802	3.5	3	2.75
SHL-02817	3.75	3.7	3
THT-02772	6.6	4.5	4
THT-02773	4.9	3.5	3.1
THT-02774	2.85	3.5	3.1
THT-02783	3.4	NR	3.15
THT-02784	-	NR	3.55
THT-02785	2	2.5	1.8
THT-02786	8	NR	1.5

NR = Not recorded. The sediment penetrated measurement was not recorded during the sampling events.

**TABLE A-5**

Sample Station Summary, Summer 2004 Sediment Sampling  
*Dow MOCA—Tittabawassee River Sediment Evaluation*

<b>Station ID</b>	<b>Northing</b>	<b>Easting</b>	<b>Sample ID</b>	<b>Sample Depth Interval (ft)</b>	<b>Analytical Batch</b>
SHL-02788	693754.91	13211495.2	070904-SED-02788-00.30	0-0.3	25631
SHL-02788	693754.91	13211495.2	070904-SED-02788-00.30	0-0.3	205011819
SHL-02788	693754.91	13211495.2	070904-SED-02788-00.30	0-0.3	205011820
SHL-02788	693754.91	13211495.2	070904-SED-02788-02.40	1.4-2.4	25631
SHL-02788	693754.91	13211495.2	070904-SED-02788-02.40	1.4-2.4	205011819
SHL-02788	693754.91	13211495.2	070904-SED-02788-02.40	1.4-2.4	205011820
SHL-02789	693611.97	13211850.8	070904-SED-02789-00.30	0-0.3	25631
SHL-02789	693611.97	13211850.8	070904-SED-02789-00.30	0-0.3	205011819
SHL-02789	693611.97	13211850.8	070904-SED-02789-00.30	0-0.3	205011820
SHL-02789	693611.97	13211850.8	070904-SED-02789-02.00	1-2	25631
SHL-02789	693611.97	13211850.8	070904-SED-02789-02.00	1-2	205011819
SHL-02789	693611.97	13211850.8	070904-SED-02789-02.00	1-2	205011820
SHL-02790	693461.33	13212161.3	070904-SED-02790-00.30	0-0.3	25631
SHL-02790	693461.33	13212161.3	070904-SED-02790-00.30	0-0.3	205011819
SHL-02790	693461.33	13212161.3	070904-SED-02790-00.30	0-0.3	205011820
SHL-02790	693461.33	13212161.3	070904-SED-02790-05.00	4-5	25631
SHL-02790	693461.33	13212161.3	070904-SED-02790-05.00	4-5	205011819
SHL-02790	693461.33	13212161.3	070904-SED-02790-05.00	4-5	205011820
SHL-02797	693243.59	13212430.5	070704-SED-02797-00.30	0-0.3	25631
SHL-02797	693243.59	13212430.5	070704-SED-02797-00.30	0-0.3	205011819
SHL-02797	693243.59	13212430.5	070704-SED-02797-00.30	0-0.3	205011820
SHL-02797	693243.59	13212430.5	070704-SED-02797-03.60	2.6-3.6	25631
SHL-02797	693243.59	13212430.5	070704-SED-02797-03.60	2.6-3.6	205011819
SHL-02797	693243.59	13212430.5	070704-SED-02797-03.60	2.6-3.6	205011820
SHL-02801	692739.97	13213227	070704-SED-02801-00.30	0-0.3	25631
SHL-02801	692739.97	13213227	070704-SED-02801-00.30	0-0.3	205011819
SHL-02801	692739.97	13213227	070704-SED-02801-00.30	0-0.3	205011820
SHL-02801	692739.97	13213227	070704-SED-02801-03.25	2.25-3.25	25631
SHL-02801	692739.97	13213227	070704-SED-02801-03.25	2.25-3.25	205011819
SHL-02801	692739.97	13213227	070704-SED-02801-03.25	2.25-3.25	205011820
SHL-02802	693041.13	13212782.1	070704-SED-02802-00.30	0-0.3	25631
SHL-02802	693041.13	13212782.1	070704-SED-02802-00.30	0-0.3	205011819
SHL-02802	693041.13	13212782.1	070704-SED-02802-00.30	0-0.3	205011820
SHL-02802	693041.13	13212782.1	070704-SED-02802-02.75	1.75-2.75	25631
SHL-02802	693041.13	13212782.1	070704-SED-02802-02.75	1.75-2.75	205011819
SHL-02802	693041.13	13212782.1	070704-SED-02802-02.75	1.75-2.75	205011820
SHL-02817	692830.56	13213027.5	070904-SED-02817-00.3	0-0.3	25125
SHL-02817	692830.56	13213027.5	070904-SED-02817-00.60	0.3-0.6	25631

TABLE A-5

Sample Station Summary, Summer 2004 Sediment Sampling  
*Dow MOCA—Tittabawassee River Sediment Evaluation*

<b>Station ID</b>	<b>Northing</b>	<b>Easting</b>	<b>Sample ID</b>	<b>Sample Depth Interval (ft)</b>	<b>Analytical Batch</b>
SHL-02817	692830.56	13213027.5	070904-SED-02817-00.60	0.3-0.6	205011819
SHL-02817	692830.56	13213027.5	070904-SED-02817-00.60	0.3-0.6	205011820
SHL-02817	692830.56	13213027.5	070904-SED-02817-03.00	2-3	25631
SHL-02817	692830.56	13213027.5	070904-SED-02817-03.00	2-3	205011819
SHL-02817	692830.56	13213027.5	070904-SED-02817-03.00	2-3	205011820
THT-02772	714151.80	13198338.1	070204-SED-02772-00.30	0-0.3	25631
THT-02772	714151.80	13198338.1	070204-SED-02772-00.30	0-0.3	205011819
THT-02772	714151.80	13198338.1	070204-SED-02772-00.30	0-0.3	205011820
THT-02772	714151.80	13198338.1	070204-SED-02772-04.00	3-4	25631
THT-02772	714151.80	13198338.1	070204-SED-02772-04.00	3-4	205011819
THT-02772	714151.80	13198338.1	070204-SED-02772-04.00	3-4	205011820
THT-02773	714088.20	13198630.4	070204-SED-02773-00.30	0-0.3	25631
THT-02773	714088.20	13198630.4	070204-SED-02773-00.30	0-0.3	205011819
THT-02773	714088.20	13198630.4	070204-SED-02773-00.30	0-0.3	205011820
THT-02773	714088.20	13198630.4	070204-SED-02773-04.90	3.9-4.9	25631
THT-02773	714088.20	13198630.4	070204-SED-02773-04.90	3.9-4.9	205011819
THT-02773	714088.20	13198630.4	070204-SED-02773-04.90	3.9-4.9	205011820
THT-02774	713978.03	13198693.3	070204-SED-02774-00.30	0-0.3	25631
THT-02774	713978.03	13198693.3	070204-SED-02774-00.30	0-0.3	205011819
THT-02774	713978.03	13198693.3	070204-SED-02774-00.30	0-0.3	205011820
THT-02774	713978.03	13198693.3	070204-SED-02774-02.85	1.85-2.85	25631
THT-02774	713978.03	13198693.3	070204-SED-02774-02.85	1.85-2.85	205011819
THT-02774	713978.03	13198693.3	070204-SED-02774-02.85	1.85-2.85	205011820
THT-02783	713921.28	13198726.6	070104-SED-02783-00.30	0-0.3	25631
THT-02783	713921.28	13198726.6	070104-SED-02783-00.30	0-0.3	205011819
THT-02783	713921.28	13198726.6	070104-SED-02783-00.30	0-0.3	205011820
THT-02783	713921.28	13198726.6	070104-SED-02783-03.40	2.4-3.4	25631
THT-02783	713921.28	13198726.6	070104-SED-02783-03.40	2.4-3.4	205011819
THT-02783	713921.28	13198726.6	070104-SED-02783-03.40	2.4-3.4	205011820
THT-02784	713800.97	13198742.8	070104-SED-02784-00.30	0-0.3	25631
THT-02784	713800.97	13198742.8	070104-SED-02784-00.30	0-0.3	205011819
THT-02784	713800.97	13198742.8	070104-SED-02784-00.30	0-0.3	205011820
THT-02784	713800.97	13198742.8	070104-SED-02784-03.55	2.55-3.55	25631
THT-02784	713800.97	13198742.8	070104-SED-02784-03.55	2.55-3.55	205011819
THT-02784	713800.97	13198742.8	070104-SED-02784-03.55	2.55-3.55	205011820
THT-02785	713411.82	13198779	070104-SED-02785-00.30	0-0.3	25631
THT-02785	713411.82	13198779	070104-SED-02785-00.30	0-0.3	205011819
THT-02785	713411.82	13198779	070104-SED-02785-00.30	0-0.3	205011820
THT-02785	713411.82	13198779	070104-SED-02785-01.80	0.8-1.8	25631

TABLE A-5

Sample Station Summary, Summer 2004 Sediment Sampling  
*Dow MOCA—Tittabawassee River Sediment Evaluation*

<b>Station ID</b>	<b>Northing</b>	<b>Easting</b>	<b>Sample ID</b>	<b>Sample Depth Interval (ft)</b>	<b>Analytical Batch</b>
THT-02785	713411.82	13198779	070104-SED-02785-01.80	0.8-1.8	205011819
THT-02785	713411.82	13198779	070104-SED-02785-01.80	0.8-1.8	205011820
THT-02786	712887.96	13198662.4	070104-SED-02786-00.30	0-0.3	25631
THT-02786	712887.96	13198662.4	070104-SED-02786-00.30	0-0.3	205011819
THT-02786	712887.96	13198662.4	070104-SED-02786-00.30	0-0.3	205011820
THT-02786	712887.96	13198662.4	070104-SED-02786-01.50	0.5-1.5	25631
THT-02786	712887.96	13198662.4	070104-SED-02786-01.50	0.5-1.5	205011819
THT-02786	712887.96	13198662.4	070104-SED-02786-01.50	0.5-1.5	205011820

**TABLE A-6**

Summer 2004 QC Sample Summary, Vertical Variability  
*Dow MOCA—Tittabawassee River Sediment Evaluation*

QC Sample Type	Number of QC Samples Collected	Actual Event Frequency <sup>1</sup>	MOCA QAPP-Specified Frequency <sup>1</sup>
Trip Blanks	0 <sup>2</sup>	One per cooler containing samples for VOC analysis	One per cooler containing samples for VOC analysis
Matrix Spikes/Matrix Spike Duplicates	4 <sup>3</sup>	7.14%	5.0%
Field Duplicates	4 <sup>4</sup>	7.14%	10%
Field Blanks	0 <sup>5</sup>	0%	One per source of water used for decontamination
Equipment Blanks	2	3.57%	5.0%

<sup>1</sup> Frequency requirements are program wide frequencies and requirements, if not met above, will be met on a program wide basis.

<sup>2</sup> Samples for VOC analysis were not collected as part of this sampling.

<sup>3</sup> Two MS/MSDs were collected for dioxin/furan analyses. Two MS/MSDs were collected for TOC and grain-size analyses.

<sup>4</sup> Two field duplicates were collected for dioxin/furan analyses. Two field duplicates were collected for TOC and grain-size analyses.

<sup>5</sup> Not required since no equipment decontamination was performed.

**Appendix B**

**Data Validation Summary Report**

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The purpose of this memorandum is to present the results of the data validation process for the samples collected for The Dow Chemical Company Tittabawassee River Sampling Events at the Dow Chemical Company site in Midland, Michigan. The samples were collected during two separate sampling events. The first event occurred between the dates of November 6, 2003 and December 11, 2003, and the second event took place between the dates of July 1 and July 9, 2004.

The Quality Control areas that were reviewed and the resulting findings are documented within each subsection that follows. This data were validated for compliance with the analytical method requirements. This process also included a review of the data to assess the accuracy, precision, and completeness based upon procedures described in the guidance documents such as the Environmental Protection Agency (EPA) National Functional Guidelines for Inorganic Data Review (EPA 2002), National Functional Guidelines for Organic Data Review (EPA 1999), National Functional Guidelines for Chlorinated Dioxin/Furan Data Review (EPA 2002), and the Quality Control Criteria provided in the Quality Assurance Project Plan (QAPP). Quality assurance/quality control (QA/QC) summary forms and data reports provided by the laboratory were reviewed.

Samples were submitted to Gulf Coast Analytical Laboratories, Inc., in Baton Rouge, Louisiana for analyses of Total Organic Carbon by SW-846 Method 9060, and Particle Size by ASTM Method D422. The samples requiring Dioxin/Furan analyses were submitted to Alta Analytical Laboratory, Inc., in El Dorado Hills, California.

Sample results that were not within the acceptance limits were appended with a primary qualifying flag by CH2M HILL, which consisted of a single- or double-letter code that indicated a possible problem with the data. The qualifying flags originated during the data review and validation processes. In addition, secondary, "sub-qualifier" flags were also applied. The secondary qualifiers provide the reasoning behind the assignment of a qualifier flag to the data.

Table B-1 lists the changes in data qualifiers, due to the validation process, except for specific samples requiring volatile analyses that were qualified due to low surrogate recoveries only. It contains columns for the Laboratory Qualifier (Lab Qual) as received from the laboratory, primary qualifiers (Final Qual), and secondary qualifiers (Validation Reasons). The primary and secondary qualifiers are presented and defined below.

The following primary flags were used to qualify the data:

- [=] Detected. The analyte was analyzed for and detected at the concentration shown.
- [J] Estimated. The analyte was present but the reported value may not be accurate or precise.
- [U] Undetected. The analyte was analyzed for but not detected above the method detection limit.
- [UJ] Detection limit estimated. The analyte was analyzed for but qualified as not detected; the result is estimated.
- [R] Rejected. The data are not useable.

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[X] Excluded. Data not used due to dilution or reanalysis; another value is more appropriate.

The following Secondary Qualifier Codes were used to qualify the data.

Validation	
Reason	Definition
2SH	Second source calibration verification standard greater than the upper control limit
2SL	Second source calibration verification standard less than the lower control limit
ABH	Ambient blank concentration greater than the RL
ABL	Ambient blank concentration less than the RL
BKD	The result is qualified because the DDT and/or Endrin breakdown was greater than 20%.
CBKD	The result is qualified because the combined DDT/Endrin breakdown is greater than 30%.
CCBH	Continuing calibration blank concentration greater than the RL
CCBL	Continuing calibration blank concentration less than RL
CCC	CCC Failure
CCRRF	Continuing calibration relative response factor below the LCL
CCVF	Continuing Calibration not analyzed at the required frequency
CCVH	Continuing calibration recovery greater than upper control limit
CCVL	Continuing calibration recovery less than lower control limit
CF	Confirmation result
CFP	Confirmation precision exceeded
CO	Compounds were reported combined on one column
DL	Secondary dilution
EBH	Equipment blank concentration greater than the RL
EBL	Equipment blank concentration less than the RL
EMPC	Estimated Maximum Possible Concentration Reported
FBH	Field blank concentration greater than the RL
FBL	Field blank concentration less than the RL
FD	Field duplicate exceeds RPD criteria
GPC	The results are qualified due to GPC calibration deficiencies.
HTA	Analytical Holding Time exceeded
HTP	Preparation Holding Time exceeded
IB	Result between the MDL and RL
ICBH	Initial calibration blank concentration greater than the RL
ICBL	Initial calibration blank concentration less than RL
ICR2	Initial calibration exceeded the R2 for first order regression
ICRR	Exceeds RSD criteria and initial calibration exceeded the R2 for first order regression
ICRRF	Initial calibration relative response factor below the LCL
ICRSD	Initial calibration RSD exceeded
ICSP	Single Point Initial Calibration used for Quantitation
ICVSH	Initial calibration verification recovery greater than upper control limit
ICVSL	Initial calibration verification recovery less than lower control limit
ISH	Internal standard response exceeded the UCL criteria

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<b>Validation</b>	
<b>Reason</b>	<b>Definition</b>
ISL	Internal standard response exceeded the LCL criteria
LBH	Laboratory blank contamination greater than the RL
LBL	Laboratory blank contamination less than the RL
LCSDH	LCSD recovery greater than criteria
LCSDL	LCSD recovery less than the criteria
LCSH	LCS recovery greater than criteria
LCSL	LCS recovery less than the criteria
LCSP	LCS/LCSD RPD criteria exceeded
LDP	Laboratory Duplicate Precision out
LR	Linear range exceeded. Concentration above linear range.
MSA	Quantitated by the method of standard additions
MSALL	Global matrix spike flagging
MSAR2	method of standard additions R2 out
MSDH	Matrix spike duplicate recovery criteria greater than the upper limit
MSDL	Matrix spike duplicate recovery criteria less than the lower limit
MSDP	Matrix Spike Duplicate RPD criteria exceedance
MSH	Matrix spike recovery criteria greater than the upper limit
MSL	Matrix spike recovery criteria less than the lower limit
NMS	Not Site-specific Matrix Spike
PH	Sample pH out. Not properly preserved.
PRM	Result differs from Preliminary Result
PSH	Post spike recovery criteria greater than the upper limit
PSL	Post spike recovery criteria less than the lower limit
RA	Sample was reanalyzed
RE	Sample was re-extracted and reanalyzed
RT	Result is outside the laboratory determined retention time window
SCRN	Screening method and/or data
SDIL	Serial Dilution %D exceeds the upper control limit
SPCC	SPCC Failure
SSH	Surrogate recovery greater than upper limit
SSL	Surrogate recovery less than lower limit
SSR	Surrogate spike recovery <10%
TBH	Trip blank concentration greater than the RL
TBL	Trip blank concentration less than the RL
TD	Total Concentration < Dissolved Concentration
TEMP	Cooler temperature out upon arrival
TIC	Tentatively identified compound
TN	GC/MS tune does not meet criteria
XCC	No Continuing Calibration analyzed in the analytical batch
X-DL	Data not used due to dilution; another value is more appropriate or data were not requested
XIC	No initial calibration analyzed in the analytical batch
XICVS	Initial calibration verification standard was not analyzed
XLCS	No LCS in the analytical batch
XLD	Laboratory Duplicate not reported

Validation		
Reason		Definition
XMS	Matrix Spike not reported	
XMSD	Matrix Spike Duplicate not reported	
X-RE	Data not used due to reanalysis another value is more appropriate or data were not requested	

## Organic Parameters

### Quality Control Review

The following list represents the QA/QC measures that were reviewed during the data quality evaluation procedure for the Dioxin/Furan data.

- **Holding Times**—The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples**—Method blanks were provided for this project. Blank samples enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.
- **Surrogate Recoveries**—Surrogate Compounds are added to each sample and the recoveries are used to monitor lab performance and possible matrix interference.
- **Lab Control Sample/Lab Control Sample Duplicate (LCS/LCSD)**—These samples are a “controlled matrix”, either laboratory reagent water or Ottawa sand, in which target compounds have been added prior to extraction/analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples**—Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. Precision information is also determined by calculating the reproducibility between the recoveries of each spiked parameter.
- **Field Duplicate Samples**—These samples are collected to determine precision between a native and it's duplicate. This information can only be determined when target compounds are detected.
- **GC/MS Tuning**—The mass spectrum of the tuning compound is evaluated for method compliance. The criteria are established to verify the proper mass assignment and mass resolution.
- **Initial Calibration**—The initial calibration ensures that the instrument is capable of producing acceptable qualitative and quantitative data for the compounds of interest.
- **Continuing Calibration**—The continuing calibration checks satisfactory performance of the instrument and its predicted response to the target compounds.

- 
- **Internal Standards** – The internal standards (retention time and response) are evaluated for method compliance. The internal standards are used in quantitation of the target parameters and monitor the instrument sensitivity and response for stability during each analysis.
  - **Labeled Standard and Cleanup Standard Recoveries** – Labeled Standards and Cleanup Standard are added to each sample. The recoveries are used to monitor laboratory and method performance, and possible matrix interference.
  - **Window Defining Mix/Column Performance Check** – The window defining mix establishes the appropriate switching times for the Selected Ion Monitoring (SIM) descriptors, and contains the first and last eluting isomers in each homologue.
  - **Confirmation** – SW-846 method 8000 requires confirmation when the composition of samples is not well characterized. Chromatographic interferences result from co-elution of one or more compounds with the analyte of interest, or may be the result of the presence of a non-analyte peak in the retention time window of an analyte. Such co-elution problems affect quantitation as well as identification, and may result in poor agreement between the quantitative results from two dissimilar columns. Therefore, even when the identification has been confirmed on a dissimilar column, the agreement of the quantitative results on both columns is evaluated. Per SW-86 method 8000, 40% RPD criteria was used as the acceptance limit.

## Holding Times

The holding times for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP. Samples were frozen upon collection and submitted to the laboratory at a later date. No flags were applied. Samples were frozen upon collection and submitted to the laboratory at a later date. No flags were applied.

## Blank Samples

Blank samples for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

Dioxin/furan sample results were not qualified as not detected due to potential blank contamination. Detected results were qualified "J", as estimated.

Sample results that were qualified due to potential blank contamination are listed in Table B-1 with a Validation Note of "EBL", "FBL" or "LBL", to signify the associated blank sample with potential contamination.

## Surrogates

The surrogate recoveries for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

The surrogate recovery for Terphenyl-d14 in the soil laboratory method blank 216878, for method 8270 was 145%, above the QC limits of 51-135 percent recovery. All sample recoveries were acceptable, therefore no flags were applied.

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## **Lab Control Sample/Lab Control Sample Duplicate (LCS/LCSD)**

The LCS/LCSD recoveries and relative percent differences (RPD) for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

The LCS/LCSD associated with the Semivolatile analysis of the equipment blank had some RPD exceedances, but no results were qualified due to LCS recoveries out of criteria.

## **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples**

The MS/MSD recoveries and relative percent differences (RPD) for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

Aroclor-1260 was recovered high in one MS (121604-SED-03225-04.00). Aroclor-1260 was not detected in the native sample, therefore no flags were applied.

## **Field Duplicate Samples**

The field duplicate precision for each parameter was evaluated according to SW-846 requirements and those presented in the QAPP.

Samples 070704-SED-02797-03.60 / 070704-SED-02797-03.60D did not meet the duplicate criteria for Total TCDD. Samples 111803-SED-02253-02.20 / 111803-SED-02253-02.20D did not meet the duplicate criteria for selected analytes. No flags are applied for field duplicates.

Table B-2 lists the field duplicate results exceeding guidance criteria. No flags were applied based upon field duplicate precision criteria.

## **GC/MS Tuning**

The GC/MS tuning criteria for each parameter were evaluated according to SW-846 requirements.

All tuning criteria were met. No flags were applied.

## **Initial and Continuing Calibration**

The initial and continuing calibration criteria for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP. The following compounds exceeded initial calibration Relative Standard Deviation (%RSD) criteria for samples analyzed on 1/14/2005: Benzo(a)anthracene-34.97%, Benzo(a)pyrene-18.5%, Indeno(1,2,3-cd)pyrene-20.4%, and Benzo(g,h,i)perylene-16.2%.

Indeno(1,2,3-cd)pyrene and Dibenzo(a,h)anthracene exceeded initial calibration Relative Standard Deviation (%RSD) criteria at 16.5 and 23.4 percent respectively, for samples analyzed on 1/18/2005.

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Flags were applied to the compounds in the associated samples in the following manner:

- When the percent Relative Standard Deviation (%RSD) or correlation coefficient ( $R^2$ ) was out in the initial calibration, all associated samples were qualified. Detected compounds were flagged "J" and non-detected compounds were flagged "UJ", as estimated.

Semivolatile sample results were qualified due to calibration recoveries out of criteria and are listed in Table B-1 with a Validation Note of "ICRSD".

## Internal Standards

The internal standards for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

All internal standard recovery criteria were met, therefore no flags were applied.

## Labeled Standard and Cleanup Standards

The standard recoveries for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

All standards criteria were met in all samples, except for 13C-1,2,3,4,7,8,9-HpCDF and 13C-OCDF in the LCS and method blank for method 8290. The recoveries ranged from 33 to 37 percent, slightly below QC limits of 40 percent. No flags were applied.

## Window Defining Mix/Column Performance Check

The window defining mix and column performance check were evaluated according to SW-846 requirements and those presented in the QAPP.

All window defining mix criteria were met. No flags were applied.

## Confirmation

The confirmation results for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

All confirmation criteria were met. No flags were applied.

# Inorganic Parameters

## Quality Control Review

The following list represents the QA/QC measures that were reviewed during the data quality evaluation procedure for inorganic parameters.

- **Holding Times**—The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples**—Sample preparation blanks, field blanks, initial calibration blanks/continuing calibration blanks were provided for this project. Blank samples

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enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.

- **Lab Control Sample (LCS)** – This sample is a “controlled matrix”, in which target parameters have been added prior to digestion/analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Field Duplicate Samples** – These samples are collected to determine precision between a native and its duplicate. This information can only be determined when target compounds are detected.
- **Initial Calibration Verification** – This parameter ensures that the instrument is capable of producing acceptable quantitative data for the target analyte list to be measured.
- **Continuing Calibration Verification** – This one-point, mid-range parameter establishes that the initial calibration is still valid by checking the performance of the instrument on a continual basis.

## Holding Times

The holding times for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP. Samples were frozen upon collection and submitted to the laboratory at a later date. No flags were applied.

## Blank Samples

Blank samples for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

If a target parameter was reported in a field sample, and the concentration was below the level determined to be due to blank contamination (5 times the concentration in the associated QC blank samples), it was flagged as “U”, not detected. Initial and continuing calibration blanks were also evaluated for possible contamination.

A single TOC sample result was qualified due to potential blank contamination and is listed in Table B-1 with a Validation Note of “EBL”.

## Lab Control Sample (LCS)

The LCS recoveries for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

All LCS criteria were met. No flags were applied.

## Field Duplicate Samples

The field duplicate precision for each parameter was evaluated according to SW-846 requirements and those presented in the QAPP.

Samples 111803-SED-02253-2.10 / 111803-SED-02253-2.10D did not meet the field duplicate criteria for TOC with results of Non-detect (RL = 100 mg/kg) / 7384 mg/kg. No flags applied for field duplicate precision.

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All other field duplicate precision criteria were met. No flags were applied.

### **Initial and Continuing Calibration**

The initial and continuing calibration criteria for each parameter were evaluated according to SW-846 requirements and those presented in the QAPP.

All initial and continuing calibration criteria were met. No flags were applied.

### **Rejected Data**

There were no results rejected due to associated QC parameters out of criteria, such that there is not a valid result for that parameter in each sample.

### **Conclusion**

A review of the analytical data submitted for The Dow Chemical Company Tittabawassee River Sampling Events has been completed. An overall evaluation of the data indicates that the sample handling, shipment, and analytical procedures have been adequately completed. The validation review demonstrated that the analytical systems were generally in control and the data results can be used in the decision making process.

Conclusions of the data quality evaluation process include the following:

- The laboratory analyzed the samples according to the EPA methods stated in the work plan as demonstrated by the deliverable summaries and analytical run sequences.
- Concentrations of blank contaminants were applied according to EPA *National Functional Guidelines* in order to reflect sample values that may be attributed to field or laboratory contamination.
- Sample results for target organic compounds above the MDL but less than the CRQL should be considered as uncertain but indicative of the presence of that compound at an estimated concentration.
- The low number of surrogate spike recoveries, MS/MSD, and field duplicate results, out of acceptance limits, indicate that the sample matrix did not significantly interfere with the overall analytical process.

The project objectives or PARCCs were met, and the data can be used in the project decision-making process as qualified by the data quality evaluation process.

TABLE B-1

Changed Qualifiers, Vertical Variability

Dow MOCA—Tittabawassee River Sediment

Field Sample ID	Location ID	Sample Purpose	Sample Date	Parameter Name	Report Result	Report Units	Validation Qualifier	Use Flag	Detected	Validation Reason Codes	Lab Result	Lab Units	Lab Qualifier	Analytical Method
070704-SED-02797-03.60	SHL-02797	N	7/7/2004	Total Organic Carbon	1080	mg/kg	U	Y	Y	EBL	1080	MG/KG	=	SW9060
070904-SED-02790-05.00-D	SHL-02790	FD	7/9/2004	Total Tetrachloro-dibenzofuran	86.8	ng/Kg	J	Y	Y	EMPC	86.8	pg/g	=D	SW8290
070904-SED-02790-05.00-D	SHL-02790	FD	7/9/2004	Total Pentachloro-dibenzofuran	33.8	ng/Kg	J	Y	Y	EMPC	33.8	pg/g	=D	SW8290
070904-SED-02817-03.00	SHL-02817	N	7/9/2004	Total Tetrachloro-dibenzofuran	86.1	ng/Kg	J	Y	Y	EMPC	86.1	pg/g	=D	SW8290
070904-SED-02817-03.00	SHL-02817	N	7/9/2004	Total Pentachloro-dibenzofuran	33	ng/Kg	J	Y	Y	EMPC	33	pg/g	=D	SW8290
070904-SED-02817-00.30	SHL-02817	N	7/9/2004	Total Tetrachloro-dibenzofuran	381	ng/Kg	J	Y	Y	EMPC	381	pg/g	=D	SW8290
070904-SED-02817-00.30	SHL-02817	N	7/9/2004	Total Pentachloro-dibenzofuran	236	ng/Kg	J	Y	Y	EMPC	236	pg/g	=D	SW8290
070904-SED-02790-05.00	SHL-02790	N	7/9/2004	Total Tetrachloro-dibenzofuran	115	ng/Kg	J	Y	Y	EMPC	115	pg/g	=D	SW8290
070904-SED-02790-05.00	SHL-02790	N	7/9/2004	Total Pentachloro-dibenzofuran	36.7	ng/Kg	J	Y	Y	EMPC	36.7	pg/g	=D	SW8290
070904-SED-02790-00.30	SHL-02790	N	7/9/2004	Total Tetrachloro-dibenzofuran	64.7	ng/Kg	J	Y	Y	EMPC	64.7	pg/g	=D	SW8290
070904-SED-02790-00.30	SHL-02790	N	7/9/2004	Total Pentachloro-dibenzofuran	21	ng/Kg	J	Y	Y	EMPC	21	pg/g	=D	SW8290
070904-SED-02789-02.00	SHL-02789	N	7/9/2004	Total Tetrachloro-dibenzofuran	692	ng/Kg	J	Y	Y	EMPC	692	pg/g	=D	SW8290
070904-SED-02789-02.00	SHL-02789	N	7/9/2004	Total Pentachloro-dibenzofuran	320	ng/Kg	J	Y	Y	EMPC	320	pg/g	=D	SW8290
070904-SED-02789-00.30	SHL-02789	N	7/9/2004	Total Tetrachloro-dibenzofuran	582	ng/Kg	J	Y	Y	EMPC	582	pg/g	=D	SW8290
070904-SED-02789-00.30	SHL-02789	N	7/9/2004	Total Pentachloro-dibenzofuran	166	ng/Kg	J	Y	Y	EMPC	166	pg/g	=D	SW8290
070204-SED-02774-02.85	THT-02774	N	7/2/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	5.91	ng/Kg	J	Y	Y	EMPC	5.91	pg/g	=D	SW8290
070204-SED-02774-02.85	THT-02774	N	7/2/2004	Total Tetrachloro-dibenzofuran	285	ng/Kg	J	Y	Y	EMPC	285	pg/g	=D	SW8290
070204-SED-02774-02.85	THT-02774	N	7/2/2004	Total Pentachloro-dibenzofuran	121	ng/Kg	J	Y	Y	EMPC	121	pg/g	=D	SW8290
070204-SED-02774-02.85	THT-02774	N	7/2/2004	Total Hexachloro-dibenzofuran	54.2	ng/Kg	J	Y	Y	EMPC	54.2	pg/g	=D	SW8290
070204-SED-02774-00.30	THT-02774	N	7/2/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	3.19	ng/Kg	J	Y	Y	EMPC	3.19	pg/g	=D	SW8290
070204-SED-02774-00.30	THT-02774	N	7/2/2004	Total Tetrachloro-dibenzofuran	196	ng/Kg	J	Y	Y	EMPC	196	pg/g	=D	SW8290
070204-SED-02774-00.30	THT-02774	N	7/2/2004	Total Pentachloro-dibenzofuran	69.9	ng/Kg	J	Y	Y	EMPC	69.9	pg/g	=D	SW8290
070204-SED-02774-00.30	THT-02774	N	7/2/2004	Total Hexachloro-dibenzofuran	44.1	ng/Kg	J	Y	Y	EMPC	44.1	pg/g	=D	SW8290
070204-SED-02773-04.90	THT-02773	N	7/2/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	3.2	ng/Kg	J	Y	Y	EMPC	3.2	pg/g	=D	SW8290
070204-SED-02773-04.90	THT-02773	N	7/2/2004	Total Tetrachloro-dibenzofuran	163	ng/Kg	J	Y	Y	EMPC	163	pg/g	=D	SW8290
070204-SED-02773-04.90	THT-02773	N	7/2/2004	Total Pentachloro-dibenzofuran	59.5	ng/Kg	J	Y	Y	EMPC	59.5	pg/g	=D	SW8290
070204-SED-02773-04.90	THT-02773	N	7/2/2004	Total Hexachloro-dibenzofuran	36	ng/Kg	J	Y	Y	EMPC	36	pg/g	=D	SW8290
070204-SED-02773-00.30	THT-02773	N	7/2/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	76.4	ng/Kg	J	Y	Y	EMPC	76.4	pg/g	=D	SW8290
070204-SED-02773-00.30	THT-02773	N	7/2/2004	Total Tetrachloro-dibenzofuran	7420	ng/Kg	J	Y	Y	EMPC	7420	pg/g	=D	SW8290
070204-SED-02773-00.30	THT-02773	N	7/2/2004	Total Pentachloro-dibenzofuran	2760	ng/Kg	J	Y	Y	EMPC	2760	pg/g	=D	SW8290
070204-SED-02773-00.30	THT-02773	N	7/2/2004	Total Hexachloro-dibenzofuran	802	ng/Kg	J	Y	Y	EMPC	802	pg/g	=D	SW8290
070204-SED-02772-00.30	THT-02772	N	7/2/2004	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.25	ng/Kg	J	Y	Y	EMPC	1.25	pg/g	=JD	SW8290
070204-SED-02772-00.30	THT-02772	N	7/2/2004	Total Tetrachloro-dibenzofuran	246	ng/Kg	J	Y	Y	EMPC	246	pg/g	=D	SW8290
070204-SED-02772-00.30	THT-02772	N	7/2/2004	Total Pentachloro-dibenzofuran	67.8	ng/Kg	J	Y	Y	EMPC	67.8	pg/g	=D	SW8290
070204-SED-02772-00.30	THT-02772	N	7/2/2004	Total Hexachloro-dibenzofuran	27.1	ng/Kg	J	Y	Y	EMPC	27.1	pg/g	=D	SW8290
070104-SED-02786-00.30	THT-02786	N	7/1/2004	Total Tetrachloro-dibenzofuran	110	ng/Kg	J	Y	Y	EMPC	110	pg/g	=D	SW8290
070104-SED-02786-00.30	THT-02786	N	7/1/2004	Total Pentachloro-dibenzofuran	34.5	ng/Kg	J	Y	Y	EMPC	34.5	pg/g	=D	SW8290
070104-SED-02785-01.80	THT-02785	N	7/1/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	26.6	ng/Kg	J	Y	Y	EMPC	26.6	pg/g	=D	SW8290
070104-SED-02785-01.80	THT-02785	N	7/1/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	110	ng/Kg	J	Y	Y	EMPC	110	pg/g	=BD	SW8290
070104-SED-02785-01.80	THT-02785	N	7/1/2004	Total Tetrachloro-dibenzofuran	1560	ng/Kg	J	Y	Y	EMPC	1560	pg/g	=D	SW8290
070104-SED-02785-01.80	THT-02785	N	7/1/2004	Total Pentachloro-dibenzofuran	653	ng/Kg	J	Y	Y	EMPC	653	pg/g	=D	SW8290
070104-SED-02785-01.80	THT-02785	N	7/1/2004	Total Hexachloro-dibenzofuran	222	ng/Kg	J	Y	Y	EMPC	222	pg/g	=D	SW8290
070104-SED-02785-01.80	THT-02785	N	7/1/2004	Total Heptachloro-dibenzofuran	269	ng/Kg	J	Y	Y	EMPC	269	pg/g	=BD	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	1,2,3,7,8-PENTACHLORODIBENZOFURAN	248	ng/Kg	J	Y	Y	EMPC	248	pg/g	=D	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	603	ng/Kg	J	Y	Y	EMPC	603	pg/g	=D	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	186	ng/Kg	J	Y	Y	EMPC	186	pg/g	=D	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	25300	ng/Kg	J	Y	Y	EMPC	25300	pg/g	=BD	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	Total Tetrachloro-dibenzofuran	6460	ng/Kg	J	Y	Y	EMPC	6460	pg/g	=D	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	Total Pentachloro-dibenzofuran	8840	ng/Kg	J	Y	Y	EMPC	8840	pg/g	=D	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	Total Hexachloro-dibenzofuran	27700	ng/Kg	J	Y	Y	EMPC	27700	pg/g	=D	SW8290

TABLE B-1

Changed Qualifiers, Vertical Variability

Dow MOCA—Tittabawassee River Sediment

Field Sample ID	Location ID	Sample Purpose	Sample Date	Parameter Name	Report Result	Report Units	Validation Qualifier	Use Flag	Detected	Validation Reason Codes	Lab Result	Lab Units	Lab Qualifier	Analytical Method
070104-SED-02785-00.30	THT-02785	N	7/1/2004	Total Heptachloro-dibenzofuran	164000	ng/Kg	J	Y	Y	EMPC	164000	pg/g	=BD*	SW8290
070104-SED-02784-03.55	THT-02784	N	7/1/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	31.4	ng/Kg	J	Y	Y	EMPC	31.4	pg/g	=D	SW8290
070104-SED-02784-03.55	THT-02784	N	7/1/2004	Total Tetrachloro-dibenzofuran	1340	ng/Kg	J	Y	Y	EMPC	1340	pg/g	=D	SW8290
070104-SED-02784-03.55	THT-02784	N	7/1/2004	Total Pentachloro-dibenzofuran	705	ng/Kg	J	Y	Y	EMPC	705	pg/g	=D	SW8290
070104-SED-02784-03.55	THT-02784	N	7/1/2004	Total Hexachloro-dibenzofuran	293	ng/Kg	J	Y	Y	EMPC	293	pg/g	=D	SW8290
070104-SED-02784-00.30	THT-02784	N	7/1/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1.64	ng/Kg	J	Y	Y	EMPC	1.64	pg/g	=JD	SW8290
070104-SED-02784-00.30	THT-02784	N	7/1/2004	Total Tetrachloro-dibenzofuran	255	ng/Kg	J	Y	Y	EMPC	255	pg/g	=D	SW8290
070104-SED-02784-00.30	THT-02784	N	7/1/2004	Total Pentachloro-dibenzofuran	57.6	ng/Kg	J	Y	Y	EMPC	57.6	pg/g	=D	SW8290
070104-SED-02784-00.30	THT-02784	N	7/1/2004	Total Hexachloro-dibenzofuran	30.2	ng/Kg	J	Y	Y	EMPC	30.2	pg/g	=D	SW8290
070104-SED-02783-03.40	THT-02783	N	7/1/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2.17	ng/Kg	J	Y	Y	EMPC	2.17	pg/g	=JD	SW8290
070104-SED-02783-03.40	THT-02783	N	7/1/2004	Total Tetrachloro-dibenzofuran	231	ng/Kg	J	Y	Y	EMPC	231	pg/g	=D	SW8290
070104-SED-02783-03.40	THT-02783	N	7/1/2004	Total Pentachloro-dibenzofuran	71.5	ng/Kg	J	Y	Y	EMPC	71.5	pg/g	=D	SW8290
070104-SED-02783-03.40	THT-02783	N	7/1/2004	Total Hexachloro-dibenzofuran	32.4	ng/Kg	J	Y	Y	EMPC	32.4	pg/g	=D	SW8290
070104-SED-02783-00.30	THT-02783	N	7/1/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	4.24	ng/Kg	J	Y	Y	EMPC	4.24	pg/g	=D	SW8290
070104-SED-02783-00.30	THT-02783	N	7/1/2004	Total Tetrachloro-dibenzofuran	324	ng/Kg	J	Y	Y	EMPC	324	pg/g	=D	SW8290
070104-SED-02783-00.30	THT-02783	N	7/1/2004	Total Pentachloro-dibenzofuran	115	ng/Kg	J	Y	Y	EMPC	115	pg/g	=D	SW8290
070104-SED-02783-00.30	THT-02783	N	7/1/2004	Total Hexachloro-dibenzofuran	43.1	ng/Kg	J	Y	Y	EMPC	43.1	pg/g	=D	SW8290
070704-SED-02802-00.30	SHL-02802	N	7/7/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2.23	ng/Kg	J	Y	Y	EMPC	2.23	pg/g	=JD	SW8290
070704-SED-02802-00.30	SHL-02802	N	7/7/2004	Total Tetrachloro-dibenzofuran	216	ng/Kg	J	Y	Y	EMPC	216	pg/g	=D	SW8290
070704-SED-02802-00.30	SHL-02802	N	7/7/2004	Total Pentachloro-dibenzofuran	63.9	ng/Kg	J	Y	Y	EMPC	63.9	pg/g	=D	SW8290
070704-SED-02802-00.30	SHL-02802	N	7/7/2004	Total Hexachloro-dibenzofuran	24.4	ng/Kg	J	Y	Y	EMPC	24.4	pg/g	=D	SW8290
070704-SED-02801-03.25	SHL-02801	N	7/7/2004	Total Tetrachloro-dibenzofuran	2.05	ng/Kg	J	Y	Y	EMPC	2.05	pg/g	=D	SW8290
070704-SED-02801-00.30	SHL-02801	N	7/7/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2.32	ng/Kg	J	Y	Y	EMPC	2.32	pg/g	=JD	SW8290
070704-SED-02801-00.30	SHL-02801	N	7/7/2004	Total Tetrachloro-dibenzofuran	118	ng/Kg	J	Y	Y	EMPC	118	pg/g	=D	SW8290
070704-SED-02801-00.30	SHL-02801	N	7/7/2004	Total Pentachloro-dibenzofuran	51.8	ng/Kg	J	Y	Y	EMPC	51.8	pg/g	=D	SW8290
070704-SED-02801-00.30	SHL-02801	N	7/7/2004	Total Hexachloro-dibenzofuran	24.1	ng/Kg	J	Y	Y	EMPC	24.1	pg/g	=D	SW8290
070704-SED-02797-00.30	SHL-02797	N	7/7/2004	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	108	ng/Kg	J	Y	Y	EMPC	108	pg/g	=D	SW8290
070704-SED-02797-00.30	SHL-02797	N	7/7/2004	Total Tetrachloro-dibenzofuran	6660	ng/Kg	J	Y	Y	EMPC	6660	pg/g	=D	SW8290
070704-SED-02797-00.30	SHL-02797	N	7/7/2004	Total Pentachloro-dibenzofuran	3570	ng/Kg	J	Y	Y	EMPC	3570	pg/g	=D	SW8290
070704-SED-02797-00.30	SHL-02797	N	7/7/2004	Total Hexachloro-dibenzofuran	906	ng/Kg	J	Y	Y	EMPC	906	pg/g	=D	SW8290
111403-SED-02250-02.30	FRE-02250	N	11/14/2003	Total Tetrachloro-dibenzofuran	146	ng/Kg	J	Y	Y	EMPC	146	pg/g	=D	SW8290
111403-SED-02250-02.30	FRE-02250	N	11/14/2003	Total Pentachloro-dibenzofuran	39.1	ng/Kg	J	Y	Y	EMPC	39.1	pg/g	=D	SW8290
120803-SED-02247-03.40	FRE-02247	N	12/8/2003	Total Tetrachloro-dibenzofuran	204	ng/Kg	J	Y	Y	EMPC	204	pg/g	=D	SW8290
120803-SED-02247-03.40	FRE-02247	N	12/8/2003	Total Pentachloro-dibenzofuran	58.9	ng/Kg	J	Y	Y	EMPC	58.9	pg/g	=D	SW8290
120803-SED-02248-00.75	FRE-02248	N	12/8/2003	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1.79	ng/Kg	J	Y	Y	EMPC	1.79	pg/g	=JD	SW8290
120803-SED-02248-00.75	FRE-02248	N	12/8/2003	Total Tetrachloro-dibenzofuran	238	ng/Kg	J	Y	Y	EMPC	238	pg/g	=D	SW8290
120803-SED-02248-00.75	FRE-02248	N	12/8/2003	Total Pentachloro-dibenzofuran	58	ng/Kg	J	Y	Y	EMPC	58	pg/g	=D	SW8290
120803-SED-02248-00.75	FRE-02248	N	12/8/2003	Total Hexachloro-dibenzofuran	21.8	ng/Kg	J	Y	Y	EMPC	21.8	pg/g	=D	SW8290
110603-SED-02234-01.50	SHL-02234	N	11/6/2003	Total Tetrachloro-dibenzofuran	216	ng/Kg	J	Y	Y	EMPC	216	pg/g	=D	SW8290
110603-SED-02234-01.50	SHL-02234	N	11/6/2003	Total Pentachloro-dibenzofuran	72	ng/Kg	J	Y	Y	EMPC	72	pg/g	=D	SW8290
112603-SED-02235-02.40	SHL-02235	N	11/26/2003	Total Tetrachloro-dibenzofuran	903	ng/Kg	J	Y	Y	EMPC	903	pg/g	=D	SW8290
112603-SED-02235-02.40	SHL-02235	N	11/26/2003	Total Pentachloro-dibenzofuran	484	ng/Kg	J	Y	Y	EMPC	484	pg/g	=D	SW8290
111803-SED-02253-02.10-D	DOW-02253	FD	11/18/2003	Total Tetrachloro-dibenzofuran	412	ng/Kg	J	Y	Y	EMPC	412	pg/g	=D	SW8290
111803-SED-02253-02.10-D	DOW-02253	FD	11/18/2003	Total Pentachloro-dibenzofuran	278	ng/Kg	J	Y	Y	EMPC	278	pg/g	=D	SW8290
111803-SED-02253-02.10	DOW-02253	N	11/18/2003	Total Tetrachloro-dibenzofuran	196	ng/Kg	J	Y	Y	EMPC	196	pg/g	=D	SW8290
111803-SED-02253-02.10	DOW-02253	N	11/18/2003	Total Pentachloro-dibenzofuran	84.6	ng/Kg	J	Y	Y	EMPC	84.6	pg/g	=D	SW8290
120403-SED-02244-03.80	THT-02244	N	12/4/2003	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	26.6	ng/Kg	J	Y	Y	EMPC	26.6	pg/g	=D	SW8290
120403-SED-02244-03.80	THT-02244	N	12/4/2003	Total Tetrachloro-dibenzofuran	1660	ng/Kg	J	Y	Y	EMPC	1660	pg/g	=D	SW8290
120403-SED-02244-03.80	THT-02244	N	12/4/2003	Total Pentachloro-dibenzofuran	802	ng/Kg	J	Y	Y	EMPC	802	pg/g	=D	SW8290
120403-SED-02244-03.80	THT-02244	N	12/4/2003	Total Hexachloro-dibenzofuran	235	ng/Kg	J	Y	Y	EMPC	235	pg/g	=D	SW8290

TABLE B-1

Changed Qualifiers, Vertical Variability  
Dow MOCA—Tittabawassee River Sediment

Field Sample ID	Location ID	Sample Purpose	Sample Date	Parameter Name	Report Result	Report Units	Validation Qualifier	Use Flag	Detected	Validation Reason Codes	Lab Result	Lab Units	Lab Qualifier	Analytical Method
120303-SED-02241-02.30	THT-02241	N	12/3/2003	Total Tetrachloro-dibenzofuran	222	ng/Kg	J	Y	Y	EMPC	222	pg/g	=D	SW8290
120303-SED-02241-02.30	THT-02241	N	12/3/2003	Total Pentachloro-dibenzofuran	101	ng/Kg	J	Y	Y	EMPC	101	pg/g	=D	SW8290
120903-SED-02252-02.30	MIC-02252	N	12/9/2003	Total Tetrachloro-dibenzofuran	161	ng/Kg	J	Y	Y	EMPC	161	pg/g	=D	SW8290
120903-SED-02252-02.30	MIC-02252	N	12/9/2003	Total Pentachloro-dibenzofuran	54.5	ng/Kg	J	Y	Y	EMPC	54.5	pg/g	=D	SW8290
112503-SED-02233-03.90	SHL-02233	N	11/25/2003	Total Pentachloro-dibenzodioxin	5.91	ng/Kg	J	Y	Y	EMPC	5.91	pg/g	=	SW8290
112503-SED-02233-03.90	SHL-02233	N	11/25/2003	Total Tetrachloro-dibenzofuran	89700	ng/Kg	J	Y	Y	EMPC	89700	pg/g	=*D	SW8290
112503-SED-02233-03.90	SHL-02233	N	11/25/2003	Total Pentachloro-dibenzofuran	79200	ng/Kg	J	Y	Y	EMPC	79200	pg/g	=D	SW8290
120903-SED-02249-04.10	FRE-02249	N	12/9/2003	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	7.29	ng/Kg	J	Y	Y	EMPC	7.29	pg/g	=D	SW8290
120903-SED-02249-04.10	FRE-02249	N	12/9/2003	Total Tetrachloro-dibenzofuran	345	ng/Kg	J	Y	Y	EMPC	345	pg/g	=D	SW8290
120903-SED-02249-04.10	FRE-02249	N	12/9/2003	Total Pentachloro-dibenzofuran	148	ng/Kg	J	Y	Y	EMPC	148	pg/g	=D	SW8290
120903-SED-02249-04.10	FRE-02249	N	12/9/2003	Total Hexachloro-dibenzofuran	143	ng/Kg	J	Y	Y	EMPC	143	pg/g	=D	SW8290
110703-SED-02236-02.00	SHL-02236	N	11/7/2003	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	3.11	ng/Kg	J	Y	Y	EMPC	3.11	pg/g	=D	SW8290
110703-SED-02236-02.00	SHL-02236	N	11/7/2003	Total Tetrachloro-dibenzofuran	289	ng/Kg	J	Y	Y	EMPC	289	pg/g	=D	SW8290
110703-SED-02236-02.00	SHL-02236	N	11/7/2003	Total Pentachloro-dibenzofuran	111	ng/Kg	J	Y	Y	EMPC	111	pg/g	=D	SW8290
110703-SED-02236-02.00	SHL-02236	N	11/7/2003	Total Hexachloro-dibenzofuran	34.1	ng/Kg	J	Y	Y	EMPC	34.1	pg/g	=D	SW8290
110703-SED-02238-01.60	SHL-02238	N	11/7/2003	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	4.26	ng/Kg	J	Y	Y	EMPC	4.26	pg/g	=D	SW8290
110703-SED-02238-01.60	SHL-02238	N	11/7/2003	Total Tetrachloro-dibenzofuran	542	ng/Kg	J	Y	Y	EMPC	542	pg/g	=D	SW8290
110703-SED-02238-01.60	SHL-02238	N	11/7/2003	Total Pentachloro-dibenzofuran	155	ng/Kg	J	Y	Y	EMPC	155	pg/g	=D	SW8290
110703-SED-02238-01.60	SHL-02238	N	11/7/2003	Total Hexachloro-dibenzofuran	54.9	ng/Kg	J	Y	Y	EMPC	54.9	pg/g	=D	SW8290
070904-SED-02788-00.30	SHL-02788	N	7/9/2004	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-p-DIOXIN	144000	ng/Kg	J	Y	Y	ISH	144000	pg/g	=*	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	29100	ng/Kg	J	Y	Y	ISH	29100	pg/g	=*	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-p-DIOXIN	184000	ng/Kg	J	Y	Y	ISH	184000	pg/g	=*	SW8290
070104-SED-02785-00.30	THT-02785	N	7/1/2004	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	100000	ng/Kg	J	Y	Y	ISH	100000	pg/g	=*	SW8290
070104-SED-02786-01.50	THT-02786	N	7/1/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	0.29	ng/Kg	J	Y	N	LBL	0.29	pg/g	=JB	SW8290
070104-SED-02786-01.50	THT-02786	N	7/1/2004	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-p-DIOXIN	1.62	ng/Kg	J	Y	N	LBL	1.62	pg/g	=JB	SW8290
070104-SED-02786-01.50	THT-02786	N	7/1/2004	Total Heptachloro-dibenzodioxin	0.29	ng/Kg	J	Y	Y	LBL	0.29	pg/g	=B	SW8290
070704-SED-02801-03.25	SHL-02801	N	7/7/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	0.183	ng/Kg	J	Y	N	LBL	0.183	pg/g	=JB	SW8290
070704-SED-02801-03.25	SHL-02801	N	7/7/2004	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-p-DIOXIN	1.39	ng/Kg	J	Y	N	LBL	1.39	pg/g	=JB	SW8290
070704-SED-02801-03.25	SHL-02801	N	7/7/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.15	ng/Kg	J	Y	N	LBL	0.15	pg/g	=JB	SW8290
070704-SED-02801-03.25	SHL-02801	N	7/7/2004	Total Heptachloro-dibenzodioxin	0.356	ng/Kg	J	Y	Y	LBL	0.356	pg/g	=B	SW8290
070704-SED-02801-03.25	SHL-02801	N	7/7/2004	Total Heptachloro-dibenzofuran	0.15	ng/Kg	J	Y	Y	LBL	0.15	pg/g	=B	SW8290
070704-SED-02797-03.60	SHL-02797	N	7/7/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	0.817	ng/Kg	U	Y	N	LBL	0.817	pg/g	=JB	SW8290
070704-SED-02797-03.60	SHL-02797	N	7/7/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.322	ng/Kg	U	Y	N	LBL	0.322	pg/g	=JB	SW8290
070704-SED-02797-03.60	SHL-02797	N	7/7/2004	Total Heptachloro-dibenzofuran	0.627	ng/Kg	J	Y	Y	LBL	0.627	pg/g	=B	SW8290
070704-SED-02797-03.60-D	SHL-02797	FD	7/7/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	0.822	ng/Kg	J	Y	N	LBL	0.822	pg/g	=JB	SW8290
070704-SED-02797-03.60-D	SHL-02797	FD	7/7/2004	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.268	ng/Kg	J	Y	N	LBL	0.268	pg/g	=JB	SW8290
070704-SED-02797-03.60-D	SHL-02797	FD	7/7/2004	Total Heptachloro-dibenzofuran	0.526	ng/Kg	J	Y	Y	LBL	0.526	pg/g	=B	SW8290
120503-SED-02246-00.3	THT-02246	N	12/5/2003	Total TCDF	1370	ng/Kg	J	Y	Y	LR	1370	pg/g	=DE	SW8290
120803-SED-02247-00.3	FRE-02247	N	12/8/2003	OCDD	338	ng/Kg	J	Y	Y	LR	338	pg/g	=	SW8290
111203-SED-02245-00.3	THT-02245	N	11/12/2003	1,2,3,7,8-PeCDF	14200	ng/Kg	J	Y	Y	LR	14200	pg/g	=DE	SW8290
111203-SED-02245-00.3	THT-02245	N	11/12/2003	2,3,4,7,8-PeCDF	10900	ng/Kg	J	Y	Y	LR	10900	pg/g	=DE	SW8290
111203-SED-02245-00.3	THT-02245	N	11/12/2003	1,2,3,4,7,8-HxCDF	8630	ng/Kg	J	Y	Y	LR	8630	pg/g	=DE	SW8290
120203-SED-02239-00.3	SHL-02239	N	12/2/2003	OCDD	61.7	ng/Kg	J	Y	Y	LR	61.7	pg/g	=	SW8290
120403-SED-02244-00.3	THT-02244	N	12/4/2003	OCDD	115	ng/Kg	J	Y	Y	LR	115	pg/g	=	SW8290
112603-SED-02235-00.3	SHL-02235	N	11/26/2003	2,3,7,8-TCDF	7330	ng/Kg	J	Y	Y	LR	7330	pg/g	=E	SW8290
112603-SED-02235-00.3	SHL-02235	N	11/26/2003	1,2,3,7,8-PeCDF	3180	ng/Kg	J	Y	Y	LR	3180	pg/g	=E	SW8290
112603-SED-02235-00.3	SHL-02235	N	11/26/2003	2,3,4,7,8-PeCDF	3350	ng/Kg	J	Y	Y	LR	3350	pg/g	=E	SW8290
120303-SED-02241-00.3	THT-02241	N	12/3/2003	OCDD	7640	ng/Kg	J	Y	Y	LR	7640	pg/g	=E	SW8290
120303-SED-02241-00.3	THT-02241	N	12/3/2003	1,2,3,4,6,7,8-HxCDF	4180	ng/Kg	J	Y	Y	LR	4180	pg/g	=DE	SW8290
031004-SED-02258-00.0	FRE-02258	N	3/10/2004	OCDD	23300	ng/Kg	J	Y	Y	LR	23300	pg/g	=E	SW8290

TABLE B-1

Changed Qualifiers, Vertical Variability  
*Dow MOCA—Tittabawassee River Sediment*

Field Sample ID	Location ID	Sample Purpose	Sample Date	Parameter Name	Report Result	Report Units	Validation Qualifier	Use Flag	Detected	Validation Reason Codes	Lab Result	Lab Units	Lab Qualifier	Analytical Method
031004-SED-02258-00.0	FRE-02258	N	3/10/2004	OCDF	8170	ng/Kg	J	Y	Y	LR	8170	pg/g	=E	SW8290
031004-SED-02258-00.0	FRE-02258	N	3/10/2004	Total HpCDD	4140	ng/Kg	J	Y	Y	LR	4140	pg/g	=E	SW8290
031004-SED-02258-00.0	FRE-02258	N	3/10/2004	Total TCDF	5350	ng/Kg	J	Y	Y	LR	5350	pg/g	=DE	SW8290
031004-SED-02263-00.0	MIC-02263	N	3/10/2004	OCDD	4540	ng/Kg	J	Y	Y	LR	4540	pg/g	=E	SW8290
121103-SED-02271-00.3-D	DOW-02254	FD	12/11/2003	OCDD	3790	ng/Kg	J	Y	Y	LR	3790	pg/g	=E	SW8290
121103-SED-02271-00.3-D	DOW-02254	FD	12/11/2003	Total TCDF	2410	ng/Kg	J	Y	Y	LR	2410	pg/g	=DE	SW8290
031004-SED-02259-00.0	FRE-02259	N	3/10/2004	Total TCDF	3400	ng/Kg	J	Y	Y	LR	3400	pg/g	=DE	SW8290
031004-SED-02258-00.0	FRE-02258	N	3/10/2004	1,2,3,4,6,7,8-HpCDD	2590	ng/Kg	J	Y	Y	LR	2590	pg/g	=E	SW8290
070904-SED-02818-00.3	SHL-02818	N	7/9/2004	2,3,7,8-TCDF	2730	ng/Kg	J	Y	Y	LR	2730	pg/g	=E	SW8290
070904-SED-02818-00.3	SHL-02818	N	7/9/2004	Total TCDF	6530	ng/Kg	J	Y	Y	LR	6530	pg/g	=DE	SW8290
070904-SED-02817-00.3	SHL-02817	N	7/9/2004	OCDD	12900	ng/Kg	J	Y	Y	LR	12900	pg/g	=E	SW8290
070704-SED-02794-00.3	SHL-02794	N	7/7/2004	2,3,7,8-TCDF	1200	ng/Kg	J	Y	Y	LR	1200	pg/g	=E	SW8290
070704-SED-02794-00.3	SHL-02794	N	7/7/2004	Total TCDF	3340	ng/Kg	J	Y	Y	LR	3340	pg/g	=DE	SW8290
070704-SED-02795-00.3	SHL-02795	N	7/7/2004	2,3,7,8-TCDF	1740	ng/Kg	J	Y	Y	LR	1740	pg/g	=E	SW8290
070704-SED-02795-00.3	SHL-02795	N	7/7/2004	Total TCDF	3800	ng/Kg	J	Y	Y	LR	3800	pg/g	=DE	SW8290

TABLE B-2

Field Duplicate Results Exceeding Criteria, Vertical Variability  
*Dow MOCA—Tittabawassee River Sediment*

Field Sample ID	Duplicate Sample ID	Analytical Method	Parameter Name	Sample Matrix	Sample Result	Dup Sample Result	Units	Detected in Sample	Detected in Dup	RPD	RPD Limit
070704-SED-02797-03.60	070704-SED-02797-03.60-D	SW8290	Total Tetrachloro-dibenzofuran	SOIL	8.68	3.37	pg/g	Y	Y	88.1	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	SOIL	310	700	pg/g	Y	Y	77.2	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	SOIL	58.2	569	pg/g	Y	Y	162.9	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	SOIL	10.8	82.1	pg/g	Y	Y	71.3	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	SOIL	45.9	188	pg/g	Y	Y	121.5	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	SOIL	8.02	54.1	pg/g	Y	Y	46.1	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	2,3,4,7,8-PENTACHLORODIBENZOFURAN	SOIL	12.7	51.2	pg/g	Y	Y	120.5	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	2,3,7,8-TETRACHLORODIBENZOFURAN	SOIL	21.8	41.2	pg/g	Y	Y	61.6	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	Total Heptachloro-dibenzofuran	SOIL	216	1160	pg/g	Y	Y	137.2	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	Total Hexachloro-dibenzodioxin	SOIL	46.4	139	pg/g	Y	Y	99.9	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	Total Hexachloro-dibenzofuran	SOIL	102	544	pg/g	Y	Y	136.8	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	Total Pentachloro-dibenzodioxin	SOIL	25	44.1	pg/g	Y	Y	55.3	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	Total Pentachloro-dibenzofuran	SOIL	84.6	278	pg/g	Y	Y	106.7	35
111803-SED-02253-02.10	111803-SED-02253-02.10-D	SW8290	Total Tetrachloro-dibenzofuran	SOIL	196	412	pg/g	Y	Y	71.1	35
111803-SED-02253-2.10	111803-SED-02253-2.10D	SW9060	Total Organic Carbon	SOIL	100	7384	MG/KG	N	Y	200.0	35

**Appendix C**

**Dioxin/Furan Congener-Specific**

**Sediment Sample Results**

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TABLE C.1

Sample Results for Fall 2003 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
SHL-02234	110603-SED-02234-01.50	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	91	
SHL-02234	110603-SED-02234-01.50	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	417	
SHL-02234	110603-SED-02234-01.50	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	60.6	
SHL-02234	110603-SED-02234-01.50	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	35.4	
SHL-02234	110603-SED-02234-01.50	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	2.81	
SHL-02234	110603-SED-02234-01.50	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	8.64	
SHL-02234	110603-SED-02234-01.50	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.611	U
SHL-02234	110603-SED-02234-01.50	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	3.31	
SHL-02234	110603-SED-02234-01.50	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.14	J
SHL-02234	110603-SED-02234-01.50	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.7	J
SHL-02234	110603-SED-02234-01.50	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.895	U
SHL-02234	110603-SED-02234-01.50	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	7.09	
SHL-02234	110603-SED-02234-01.50	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.433	J
SHL-02234	110603-SED-02234-01.50	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.99	J
SHL-02234	110603-SED-02234-01.50	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	8.87	
SHL-02234	110603-SED-02234-01.50	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	28.8	
SHL-02234	110603-SED-02234-01.50	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.548	
SHL-02236	110703-SED-02236-02.00	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	16	
SHL-02236	110703-SED-02236-02.00	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	83.2	
SHL-02236	110703-SED-02236-02.00	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	17.8	
SHL-02236	110703-SED-02236-02.00	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	11.3	
SHL-02236	110703-SED-02236-02.00	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.15	J
SHL-02236	110703-SED-02236-02.00	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	10.8	
SHL-02236	110703-SED-02236-02.00	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.432	U
SHL-02236	110703-SED-02236-02.00	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	3.11	D
SHL-02236	110703-SED-02236-02.00	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.17	J
SHL-02236	110703-SED-02236-02.00	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	2.2	J
SHL-02236	110703-SED-02236-02.00	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.399	J
SHL-02236	110703-SED-02236-02.00	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	22.2	
SHL-02236	110703-SED-02236-02.00	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.614	U
SHL-02236	110703-SED-02236-02.00	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.72	J
SHL-02236	110703-SED-02236-02.00	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	22.7	
SHL-02236	110703-SED-02236-02.00	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	67.9	
SHL-02236	110703-SED-02236-02.00	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.36	
SHL-02238	110703-SED-02238-01.60	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	36.6	
SHL-02238	110703-SED-02238-01.60	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	181	
SHL-02238	110703-SED-02238-01.60	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	27.5	
SHL-02238	110703-SED-02238-01.60	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	22.1	
SHL-02238	110703-SED-02238-01.60	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.95	J
SHL-02238	110703-SED-02238-01.60	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	13.4	
SHL-02238	110703-SED-02238-01.60	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.585	U
SHL-02238	110703-SED-02238-01.60	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	4.26	D
SHL-02238	110703-SED-02238-01.60	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.01	J
SHL-02238	110703-SED-02238-01.60	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	2.66	
SHL-02238	110703-SED-02238-01.60	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.87	J
SHL-02238	110703-SED-02238-01.60	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	24.1	
SHL-02238	110703-SED-02238-01.60	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	1.12	J
SHL-02238	110703-SED-02238-01.60	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	2.34	J
SHL-02238	110703-SED-02238-01.60	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	26.1	
SHL-02238	110703-SED-02238-01.60	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	99.4	
SHL-02238	110703-SED-02238-01.60	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	2.3	
FRE-02250	111403-SED-02250-02.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	48.6	

TABLE C-1

Sample Results for Fall 2003 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

<b>Location ID</b>	<b>Field Sample ID</b>	<b>CAS #</b>	<b>Analyte</b>	<b>Result (ng/kg)</b>	<b>Qualifier</b>
FRE-02250	111403-SED-02250-02.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	148	
FRE-02250	111403-SED-02250-02.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	52.7	
FRE-02250	111403-SED-02250-02.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	18.5	
FRE-02250	111403-SED-02250-02.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.65	J
FRE-02250	111403-SED-02250-02.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	4.67	
FRE-02250	111403-SED-02250-02.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.708	U
FRE-02250	111403-SED-02250-02.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1.6	J
FRE-02250	111403-SED-02250-02.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.55	J
FRE-02250	111403-SED-02250-02.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.856	J
FRE-02250	111403-SED-02250-02.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.717	U
FRE-02250	111403-SED-02250-02.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	4.15	
FRE-02250	111403-SED-02250-02.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.67	J
FRE-02250	111403-SED-02250-02.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.11	J
FRE-02250	111403-SED-02250-02.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	5.55	
FRE-02250	111403-SED-02250-02.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	16.3	
FRE-02250	111403-SED-02250-02.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.888	
MIC-02251	111703-SED-02251-02.50	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	16.1	
MIC-02251	111703-SED-02251-02.50	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	2.66	J
MIC-02251	111703-SED-02251-02.50	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	79.5	
MIC-02251	111703-SED-02251-02.50	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.279	J
MIC-02251	111703-SED-02251-02.50	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	41.5	
MIC-02251	111703-SED-02251-02.50	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	1030	
MIC-02251	111703-SED-02251-02.50	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.239	U
MIC-02251	111703-SED-02251-02.50	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	229	
MIC-02251	111703-SED-02251-02.50	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.215	U
MIC-02251	111703-SED-02251-02.50	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	230	
MIC-02251	111703-SED-02251-02.50	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.224	U
MIC-02251	111703-SED-02251-02.50	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	2000	
MIC-02251	111703-SED-02251-02.50	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.532	J
MIC-02251	111703-SED-02251-02.50	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	102	
MIC-02251	111703-SED-02251-02.50	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	1530	
MIC-02251	111703-SED-02251-02.50	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	2910	
MIC-02251	111703-SED-02251-02.50	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.585	
SHI-02232	112403-SED-02232-03.70	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.319	U
SHI-02232	112403-SED-02232-03.70	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	0.375	J
SHI-02232	112403-SED-02232-03.70	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.217	U
SHI-02232	112403-SED-02232-03.70	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.309	U
SHI-02232	112403-SED-02232-03.70	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.137	U
SHI-02232	112403-SED-02232-03.70	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.0966	U
SHI-02232	112403-SED-02232-03.70	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.214	U
SHI-02232	112403-SED-02232-03.70	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.0883	U
SHI-02232	112403-SED-02232-03.70	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.213	U
SHI-02232	112403-SED-02232-03.70	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.154	U
SHI-02232	112403-SED-02232-03.70	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.21	U
SHI-02232	112403-SED-02232-03.70	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.252	U
SHI-02232	112403-SED-02232-03.70	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.16	U
SHI-02232	112403-SED-02232-03.70	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.106	U
SHI-02232	112403-SED-02232-03.70	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.233	U
SHI-02232	112403-SED-02232-03.70	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	0.145	U
SHI-02232	112403-SED-02232-03.70	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.198	U
SHL-02233	112503-SED-02233-03.90	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	502	
SHL-02233	112503-SED-02233-03.90	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	162	

TABLE C.1

Sample Results for Fall 2003 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

<b>Location ID</b>	<b>Field Sample ID</b>	<b>CAS #</b>	<b>Analyte</b>	<b>Result (ng/kg)</b>	<b>Qualifier</b>
SHL-02233	112503-SED-02233-03.90	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	1430	
SHL-02233	112503-SED-02233-03.90	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	19.5	
SHL-02233	112503-SED-02233-03.90	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	594	
SHL-02233	112503-SED-02233-03.90	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	14400	
SHL-02233	112503-SED-02233-03.90	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.56	U
SHL-02233	112503-SED-02233-03.90	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2930	
SHL-02233	112503-SED-02233-03.90	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.99	U
SHL-02233	112503-SED-02233-03.90	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	2820	
SHL-02233	112503-SED-02233-03.90	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	1.76	U
SHL-02233	112503-SED-02233-03.90	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	27900	
SHL-02233	112503-SED-02233-03.90	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	6.19	U
SHL-02233	112503-SED-02233-03.90	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1560	
SHL-02233	112503-SED-02233-03.90	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	22800	
SHL-02233	112503-SED-02233-03.90	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	44000	*
SHL-02233	112503-SED-02233-03.90	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	8.11	
SHL-02235	112603-SED-02235-02.40	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	47	
SHL-02235	112603-SED-02235-02.40	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	105	
SHL-02235	112603-SED-02235-02.40	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	43.4	
SHL-02235	112603-SED-02235-02.40	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	10.6	
SHL-02235	112603-SED-02235-02.40	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	12.2	
SHL-02235	112603-SED-02235-02.40	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	116	
SHL-02235	112603-SED-02235-02.40	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.03	U
SHL-02235	112603-SED-02235-02.40	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	24.1	
SHL-02235	112603-SED-02235-02.40	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.31	U
SHL-02235	112603-SED-02235-02.40	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	21.3	
SHL-02235	112603-SED-02235-02.40	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	1.01	U
SHL-02235	112603-SED-02235-02.40	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	143	
SHL-02235	112603-SED-02235-02.40	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	1.71	U
SHL-02235	112603-SED-02235-02.40	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	10.5	
SHL-02235	112603-SED-02235-02.40	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	123	
SHL-02235	112603-SED-02235-02.40	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	360	
SHL-02235	112603-SED-02235-02.40	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.09	
SHL-02237	120103-SED-02237-03.00	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.15	U
SHL-02237	120103-SED-02237-03.00	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	0.509	U
SHL-02237	120103-SED-02237-03.00	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.0546	U
SHL-02237	120103-SED-02237-03.00	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.108	U
SHL-02237	120103-SED-02237-03.00	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.043	U
SHL-02237	120103-SED-02237-03.00	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.0567	U
SHL-02237	120103-SED-02237-03.00	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.144	U
SHL-02237	120103-SED-02237-03.00	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.0534	U
SHL-02237	120103-SED-02237-03.00	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.154	U
SHL-02237	120103-SED-02237-03.00	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.085	U
SHL-02237	120103-SED-02237-03.00	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.148	U
SHL-02237	120103-SED-02237-03.00	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.0792	U
SHL-02237	120103-SED-02237-03.00	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.084	U
SHL-02237	120103-SED-02237-03.00	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.0579	U
SHL-02237	120103-SED-02237-03.00	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.0711	U
SHL-02237	120103-SED-02237-03.00	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	0.0787	U
SHL-02237	120103-SED-02237-03.00	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.0786	U
SHL-02239	120203-SED-02239-04.00	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	1.1	U
SHL-02239	120203-SED-02239-04.00	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1.29	U
SHL-02239	120203-SED-02239-04.00	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.174	U

TABLE C-1

Sample Results for Fall 2003 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

<b>Location ID</b>	<b>Field Sample ID</b>	<b>CAS #</b>	<b>Analyte</b>	<b>Result (ng/kg)</b>	<b>Qualifier</b>
SHL-02239	120203-SED-02239-04.00	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.231	U
SHL-02239	120203-SED-02239-04.00	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.0848	U
SHL-02239	120203-SED-02239-04.00	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.1	U
SHL-02239	120203-SED-02239-04.00	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.19	U
SHL-02239	120203-SED-02239-04.00	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.0973	U
SHL-02239	120203-SED-02239-04.00	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.196	U
SHL-02239	120203-SED-02239-04.00	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.153	U
SHL-02239	120203-SED-02239-04.00	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.19	U
SHL-02239	120203-SED-02239-04.00	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.207	U
SHL-02239	120203-SED-02239-04.00	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.209	U
SHL-02239	120203-SED-02239-04.00	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.107	U
SHL-02239	120203-SED-02239-04.00	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.188	U
SHL-02239	120203-SED-02239-04.00	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	0.138	U
SHL-02239	120203-SED-02239-04.00	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.187	U
SHL-02240	120203-SED-02240-01.80	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.296	U
SHL-02240	120203-SED-02240-01.80	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1.63	J
SHL-02240	120203-SED-02240-01.80	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.135	U
SHL-02240	120203-SED-02240-01.80	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.217	U
SHL-02240	120203-SED-02240-01.80	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.0941	U
SHL-02240	120203-SED-02240-01.80	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.88	J
SHL-02240	120203-SED-02240-01.80	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.136	U
SHL-02240	120203-SED-02240-01.80	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.297	J
SHL-02240	120203-SED-02240-01.80	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.145	U
SHL-02240	120203-SED-02240-01.80	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.242	U
SHL-02240	120203-SED-02240-01.80	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.139	U
SHL-02240	120203-SED-02240-01.80	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	1.92	J
SHL-02240	120203-SED-02240-01.80	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.272	U
SHL-02240	120203-SED-02240-01.80	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.0971	U
SHL-02240	120203-SED-02240-01.80	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.96	U
SHL-02240	120203-SED-02240-01.80	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	2.74	
SHL-02240	120203-SED-02240-01.80	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.154	U
THT-02241	120303-SED-02241-02.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	37.9	
THT-02241	120303-SED-02241-02.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	164	
THT-02241	120303-SED-02241-02.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	24.2	
THT-02241	120303-SED-02241-02.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	21.2	
THT-02241	120303-SED-02241-02.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	2.03	J
THT-02241	120303-SED-02241-02.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	15	
THT-02241	120303-SED-02241-02.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.412	U
THT-02241	120303-SED-02241-02.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	4.02	
THT-02241	120303-SED-02241-02.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.06	J
THT-02241	120303-SED-02241-02.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	3.63	
THT-02241	120303-SED-02241-02.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.724	J
THT-02241	120303-SED-02241-02.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	19.8	
THT-02241	120303-SED-02241-02.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.899	J
THT-02241	120303-SED-02241-02.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	2.37	J
THT-02241	120303-SED-02241-02.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	21.8	
THT-02241	120303-SED-02241-02.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	50.3	
THT-02241	120303-SED-02241-02.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.17	
THT-02242	120303-SED-02242-03.90	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.203	U
THT-02242	120303-SED-02242-03.90	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1.25	J
THT-02242	120303-SED-02242-03.90	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.231	J
THT-02242	120303-SED-02242-03.90	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.163	U

TABLE C.1

Sample Results for Fall 2003 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

<b>Location ID</b>	<b>Field Sample ID</b>	<b>CAS #</b>	<b>Analyte</b>	<b>Result (ng/kg)</b>	<b>Qualifier</b>
THT-02242	120303-SED-02242-03.90	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.0794	U
THT-02242	120303-SED-02242-03.90	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.0485	U
THT-02242	120303-SED-02242-03.90	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.131	U
THT-02242	120303-SED-02242-03.90	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.0472	U
THT-02242	120303-SED-02242-03.90	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.13	U
THT-02242	120303-SED-02242-03.90	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.0703	U
THT-02242	120303-SED-02242-03.90	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.129	U
THT-02242	120303-SED-02242-03.90	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.113	U
THT-02242	120303-SED-02242-03.90	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.0608	U
THT-02242	120303-SED-02242-03.90	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.0503	U
THT-02242	120303-SED-02242-03.90	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.0925	U
THT-02242	120303-SED-02242-03.90	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	0.274	J
THT-02242	120303-SED-02242-03.90	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.086	U
THT-02243	120403-SED-02243-03.00	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.193	U
THT-02243	120403-SED-02243-03.00	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1.51	J
THT-02243	120403-SED-02243-03.00	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.233	J
THT-02243	120403-SED-02243-03.00	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.186	U
THT-02243	120403-SED-02243-03.00	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.0791	U
THT-02243	120403-SED-02243-03.00	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	1.67	J
THT-02243	120403-SED-02243-03.00	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.101	U
THT-02243	120403-SED-02243-03.00	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.396	J
THT-02243	120403-SED-02243-03.00	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.102	U
THT-02243	120403-SED-02243-03.00	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.23	U
THT-02243	120403-SED-02243-03.00	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.101	U
THT-02243	120403-SED-02243-03.00	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	2.6	
THT-02243	120403-SED-02243-03.00	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.0899	U
THT-02243	120403-SED-02243-03.00	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.139	U
THT-02243	120403-SED-02243-03.00	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	2.2	J
THT-02243	120403-SED-02243-03.00	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	5.14	
THT-02243	120403-SED-02243-03.00	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.147	U
THT-02244	120403-SED-02244-03.80	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	70.7	
THT-02244	120403-SED-02244-03.80	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	178	
THT-02244	120403-SED-02244-03.80	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	49.2	
THT-02244	120403-SED-02244-03.80	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	20.7	
THT-02244	120403-SED-02244-03.80	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	6.79	
THT-02244	120403-SED-02244-03.80	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	117	
THT-02244	120403-SED-02244-03.80	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.785	U
THT-02244	120403-SED-02244-03.80	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	26.6	D
THT-02244	120403-SED-02244-03.80	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.89	J
THT-02244	120403-SED-02244-03.80	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	20.3	
THT-02244	120403-SED-02244-03.80	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.466	U
THT-02244	120403-SED-02244-03.80	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	215	
THT-02244	120403-SED-02244-03.80	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	1.01	J
THT-02244	120403-SED-02244-03.80	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	13.1	
THT-02244	120403-SED-02244-03.80	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	187	
THT-02244	120403-SED-02244-03.80	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	638	
THT-02244	120403-SED-02244-03.80	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.96	
THT-02246	120503-SED-02246-03.00	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.158	U
THT-02246	120503-SED-02246-03.00	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	0.569	U
THT-02246	120503-SED-02246-03.00	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.0525	U
THT-02246	120503-SED-02246-03.00	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.18	U
THT-02246	120503-SED-02246-03.00	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.0666	U

TABLE C-1

Sample Results for Fall 2003 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

<b>Location ID</b>	<b>Field Sample ID</b>	<b>CAS #</b>	<b>Analyte</b>	<b>Result (ng/kg)</b>	<b>Qualifier</b>
THT-02246	120503-SED-02246-03.00	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.0352	U
THT-02246	120503-SED-02246-03.00	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.102	U
THT-02246	120503-SED-02246-03.00	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.0333	U
THT-02246	120503-SED-02246-03.00	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.107	U
THT-02246	120503-SED-02246-03.00	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.0523	U
THT-02246	120503-SED-02246-03.00	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.103	U
THT-02246	120503-SED-02246-03.00	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.0974	U
THT-02246	120503-SED-02246-03.00	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.0569	U
THT-02246	120503-SED-02246-03.00	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.0367	U
THT-02246	120503-SED-02246-03.00	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.0826	U
THT-02246	120503-SED-02246-03.00	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	0.0469	U
THT-02246	120503-SED-02246-03.00	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.116	U
FRE-02247	120803-SED-02247-03.40	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	35.4	
FRE-02247	120803-SED-02247-03.40	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	163	
FRE-02247	120803-SED-02247-03.40	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	27.3	
FRE-02247	120803-SED-02247-03.40	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	23	
FRE-02247	120803-SED-02247-03.40	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.69	J
FRE-02247	120803-SED-02247-03.40	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	6.03	
FRE-02247	120803-SED-02247-03.40	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.569	U
FRE-02247	120803-SED-02247-03.40	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2.09	J
FRE-02247	120803-SED-02247-03.40	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.92	J
FRE-02247	120803-SED-02247-03.40	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.19	J
FRE-02247	120803-SED-02247-03.40	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.852	J
FRE-02247	120803-SED-02247-03.40	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	6.45	
FRE-02247	120803-SED-02247-03.40	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	1.1	J
FRE-02247	120803-SED-02247-03.40	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.47	J
FRE-02247	120803-SED-02247-03.40	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	9.64	
FRE-02247	120803-SED-02247-03.40	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	31.7	
FRE-02247	120803-SED-02247-03.40	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.78	
FRE-02248	120803-SED-02248-00.75	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	22.8	
FRE-02248	120803-SED-02248-00.75	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	163	
FRE-02248	120803-SED-02248-00.75	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	16.3	
FRE-02248	120803-SED-02248-00.75	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	17	
FRE-02248	120803-SED-02248-00.75	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.976	J
FRE-02248	120803-SED-02248-00.75	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	4.11	
FRE-02248	120803-SED-02248-00.75	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.45	U
FRE-02248	120803-SED-02248-00.75	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1.79	JD
FRE-02248	120803-SED-02248-00.75	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.42	J
FRE-02248	120803-SED-02248-00.75	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.787	J
FRE-02248	120803-SED-02248-00.75	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.656	U
FRE-02248	120803-SED-02248-00.75	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	5.24	
FRE-02248	120803-SED-02248-00.75	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.545	J
FRE-02248	120803-SED-02248-00.75	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.859	J
FRE-02248	120803-SED-02248-00.75	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	5.39	
FRE-02248	120803-SED-02248-00.75	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	15	
FRE-02248	120803-SED-02248-00.75	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.812	
FRE-02249	120903-SED-02249-04.10	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	288	
FRE-02249	120903-SED-02249-04.10	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1070	
FRE-02249	120903-SED-02249-04.10	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	230	
FRE-02249	120903-SED-02249-04.10	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	106	
FRE-02249	120903-SED-02249-04.10	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	6.91	
FRE-02249	120903-SED-02249-04.10	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	19.9	

TABLE C-1

Sample Results for Fall 2003 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

<b>Location ID</b>	<b>Field Sample ID</b>	<b>CAS #</b>	<b>Analyte</b>	<b>Result (ng/kg)</b>	<b>Qualifier</b>
FRE-02249	120903-SED-02249-04.10	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.916	U
FRE-02249	120903-SED-02249-04.10	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	7.29	D
FRE-02249	120903-SED-02249-04.10	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	5.51	
FRE-02249	120903-SED-02249-04.10	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	4.05	
FRE-02249	120903-SED-02249-04.10	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	1.7	J
FRE-02249	120903-SED-02249-04.10	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	15	
FRE-02249	120903-SED-02249-04.10	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	1.26	J
FRE-02249	120903-SED-02249-04.10	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	4.74	
FRE-02249	120903-SED-02249-04.10	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	21.6	
FRE-02249	120903-SED-02249-04.10	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	44.5	
FRE-02249	120903-SED-02249-04.10	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	2.56	
MIC-02252	120903-SED-02252-02.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	140	
MIC-02252	120903-SED-02252-02.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	618	
MIC-02252	120903-SED-02252-02.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	35.1	
MIC-02252	120903-SED-02252-02.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	65.8	
MIC-02252	120903-SED-02252-02.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	3.47	
MIC-02252	120903-SED-02252-02.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	9.01	
MIC-02252	120903-SED-02252-02.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.593	U
MIC-02252	120903-SED-02252-02.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2.77	
MIC-02252	120903-SED-02252-02.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.33	J
MIC-02252	120903-SED-02252-02.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.69	J
MIC-02252	120903-SED-02252-02.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.518	J
MIC-02252	120903-SED-02252-02.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	8.82	
MIC-02252	120903-SED-02252-02.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.576	U
MIC-02252	120903-SED-02252-02.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.17	J
MIC-02252	120903-SED-02252-02.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	7.96	
MIC-02252	120903-SED-02252-02.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	21.2	
MIC-02252	120903-SED-02252-02.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.445	J

Data Qualifiers: 'D' - compound was identified in an analysis at a secondary dilution factor

'J' - indicates value is an estimate

'U' - the specific isomer is reported as non-detected as a valid concentration could not be determined

\* - duplicate analysis not within control limits

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
THT-02783	070104-SED-02783-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	23.6	
THT-02783	070104-SED-02783-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	113	B
THT-02783	070104-SED-02783-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	27.9	B
THT-02783	070104-SED-02783-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	15.5	B
THT-02783	070104-SED-02783-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.48	J
THT-02783	070104-SED-02783-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	12.3	
THT-02783	070104-SED-02783-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.621	U
THT-02783	070104-SED-02783-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	4.24	D
THT-02783	070104-SED-02783-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.35	J
THT-02783	070104-SED-02783-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	2.59	
THT-02783	070104-SED-02783-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.545	J
THT-02783	070104-SED-02783-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	16.8	
THT-02783	070104-SED-02783-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.559	U
THT-02783	070104-SED-02783-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	2.05	J
THT-02783	070104-SED-02783-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	16.9	
THT-02783	070104-SED-02783-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	50.8	
THT-02783	070104-SED-02783-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.08	
THT-02783	070104-SED-02783-03.40	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	41.6	
THT-02783	070104-SED-02783-03.40	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	162	B
THT-02783	070104-SED-02783-03.40	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	34	B
THT-02783	070104-SED-02783-03.40	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	17.9	B
THT-02783	070104-SED-02783-03.40	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.28	J
THT-02783	070104-SED-02783-03.40	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	6.21	
THT-02783	070104-SED-02783-03.40	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.417	U
THT-02783	070104-SED-02783-03.40	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2.17	JD
THT-02783	070104-SED-02783-03.40	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.33	J
THT-02783	070104-SED-02783-03.40	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.35	J
THT-02783	070104-SED-02783-03.40	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.509	J
THT-02783	070104-SED-02783-03.40	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	9.5	
THT-02783	070104-SED-02783-03.40	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.596	U
THT-02783	070104-SED-02783-03.40	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.2	J
THT-02783	070104-SED-02783-03.40	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	10.6	
THT-02783	070104-SED-02783-03.40	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	35	
THT-02783	070104-SED-02783-03.40	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.25	
THT-02784	070104-SED-02784-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	32.4	
THT-02784	070104-SED-02784-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	166	B
THT-02784	070104-SED-02784-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	21.8	B
THT-02784	070104-SED-02784-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	18.8	B
THT-02784	070104-SED-02784-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.25	J
THT-02784	070104-SED-02784-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	4.79	
THT-02784	070104-SED-02784-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.395	U
THT-02784	070104-SED-02784-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1.64	JD
THT-02784	070104-SED-02784-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.44	J
THT-02784	070104-SED-02784-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.06	J
THT-02784	070104-SED-02784-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.617	J
THT-02784	070104-SED-02784-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	7.42	
THT-02784	070104-SED-02784-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.806	U
THT-02784	070104-SED-02784-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.12	J
THT-02784	070104-SED-02784-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	9.44	
THT-02784	070104-SED-02784-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	54.4	
THT-02784	070104-SED-02784-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.33	
THT-02784	070104-SED-02784-03.55	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	123	

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
THT-02784	070104-SED-02784-03.55	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	412	B
THT-02784	070104-SED-02784-03.55	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	150	B
THT-02784	070104-SED-02784-03.55	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	91.7	B
THT-02784	070104-SED-02784-03.55	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	13.4	
THT-02784	070104-SED-02784-03.55	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	106	
THT-02784	070104-SED-02784-03.55	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.95	
THT-02784	070104-SED-02784-03.55	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	31.4	D
THT-02784	070104-SED-02784-03.55	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	17.5	
THT-02784	070104-SED-02784-03.55	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	26.5	
THT-02784	070104-SED-02784-03.55	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	6.43	
THT-02784	070104-SED-02784-03.55	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	161	
THT-02784	070104-SED-02784-03.55	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	3.79	
THT-02784	070104-SED-02784-03.55	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	14.5	
THT-02784	070104-SED-02784-03.55	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	133	
THT-02784	070104-SED-02784-03.55	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	324	
THT-02784	070104-SED-02784-03.55	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	3.21	
THT-02785	070104-SED-02785-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	100000	*
THT-02785	070104-SED-02785-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	184000	*
THT-02785	070104-SED-02785-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	25300	BD
THT-02785	070104-SED-02785-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	29100	*
THT-02785	070104-SED-02785-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1650	
THT-02785	070104-SED-02785-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	929	
THT-02785	070104-SED-02785-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	12.4	
THT-02785	070104-SED-02785-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	603	D
THT-02785	070104-SED-02785-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1210	
THT-02785	070104-SED-02785-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	82.9	
THT-02785	070104-SED-02785-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	57.5	
THT-02785	070104-SED-02785-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	248	D
THT-02785	070104-SED-02785-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	4.38	
THT-02785	070104-SED-02785-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	186	D
THT-02785	070104-SED-02785-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	234	
THT-02785	070104-SED-02785-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	682	
THT-02785	070104-SED-02785-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	4.31	
THT-02785	070104-SED-02785-01.80	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	161	
THT-02785	070104-SED-02785-01.80	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	376	B
THT-02785	070104-SED-02785-01.80	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	110	BD
THT-02785	070104-SED-02785-01.80	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	63.3	B
THT-02785	070104-SED-02785-01.80	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	9.91	
THT-02785	070104-SED-02785-01.80	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	62.6	
THT-02785	070104-SED-02785-01.80	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	24.1	U
THT-02785	070104-SED-02785-01.80	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	26.6	D
THT-02785	070104-SED-02785-01.80	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	7.12	
THT-02785	070104-SED-02785-01.80	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	13.4	
THT-02785	070104-SED-02785-01.80	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	1.84	J
THT-02785	070104-SED-02785-01.80	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	88	
THT-02785	070104-SED-02785-01.80	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	2.67	
THT-02785	070104-SED-02785-01.80	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	9.7	
THT-02785	070104-SED-02785-01.80	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	90.9	
THT-02785	070104-SED-02785-01.80	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	288	
THT-02785	070104-SED-02785-01.80	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	2.93	
THT-02786	070104-SED-02786-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	26.7	
THT-02786	070104-SED-02786-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	78.1	B

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
THT-02786	070104-SED-02786-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	11.2	B
THT-02786	070104-SED-02786-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	12.1	B
THT-02786	070104-SED-02786-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.21	J
THT-02786	070104-SED-02786-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	3.48	
THT-02786	070104-SED-02786-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.283	U
THT-02786	070104-SED-02786-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1.21	J
THT-02786	070104-SED-02786-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.915	J
THT-02786	070104-SED-02786-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.432	U
THT-02786	070104-SED-02786-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.541	J
THT-02786	070104-SED-02786-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	4.17	
THT-02786	070104-SED-02786-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.411	J
THT-02786	070104-SED-02786-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.891	J
THT-02786	070104-SED-02786-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	4.9	
THT-02786	070104-SED-02786-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	15.5	
THT-02786	070104-SED-02786-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.666	
THT-02786	070104-SED-02786-01.50	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.488	U
THT-02786	070104-SED-02786-01.50	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1.62	JB
THT-02786	070104-SED-02786-01.50	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.236	U
THT-02786	070104-SED-02786-01.50	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.29	JB
THT-02786	070104-SED-02786-01.50	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.0994	U
THT-02786	070104-SED-02786-01.50	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.0788	U
THT-02786	070104-SED-02786-01.50	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.253	U
THT-02786	070104-SED-02786-01.50	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.0783	U
THT-02786	070104-SED-02786-01.50	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.258	U
THT-02786	070104-SED-02786-01.50	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.131	U
THT-02786	070104-SED-02786-01.50	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.251	U
THT-02786	070104-SED-02786-01.50	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.29	U
THT-02786	070104-SED-02786-01.50	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.178	U
THT-02786	070104-SED-02786-01.50	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.087	U
THT-02786	070104-SED-02786-01.50	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.243	U
THT-02786	070104-SED-02786-01.50	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	2.45	U
THT-02786	070104-SED-02786-01.50	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.251	U
THT-02772	070204-SED-02772-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	9.83	
THT-02772	070204-SED-02772-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	75.7	
THT-02772	070204-SED-02772-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	10.9	
THT-02772	070204-SED-02772-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	11	
THT-02772	070204-SED-02772-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.671	J
THT-02772	070204-SED-02772-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	5.22	
THT-02772	070204-SED-02772-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.398	J
THT-02772	070204-SED-02772-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1.86	J
THT-02772	070204-SED-02772-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.27	J
THT-02772	070204-SED-02772-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.15	J
THT-02772	070204-SED-02772-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.338	U
THT-02772	070204-SED-02772-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	8.04	
THT-02772	070204-SED-02772-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.726	J
THT-02772	070204-SED-02772-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.25	JD
THT-02772	070204-SED-02772-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	9	
THT-02772	070204-SED-02772-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	30.8	
THT-02772	070204-SED-02772-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.59	
THT-02772	070204-SED-02772-04.00	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.269	U
THT-02772	070204-SED-02772-04.00	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1.17	J
THT-02772	070204-SED-02772-04.00	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.117	U

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
THT-02772	070204-SED-02772-04.00	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.234	U
THT-02772	070204-SED-02772-04.00	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.0722	U
THT-02772	070204-SED-02772-04.00	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.0698	U
THT-02772	070204-SED-02772-04.00	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.226	U
THT-02772	070204-SED-02772-04.00	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.0606	U
THT-02772	070204-SED-02772-04.00	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.214	U
THT-02772	070204-SED-02772-04.00	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.108	U
THT-02772	070204-SED-02772-04.00	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.218	U
THT-02772	070204-SED-02772-04.00	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.142	U
THT-02772	070204-SED-02772-04.00	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.137	U
THT-02772	070204-SED-02772-04.00	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.0698	U
THT-02772	070204-SED-02772-04.00	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.124	U
THT-02772	070204-SED-02772-04.00	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	0.103	U
THT-02772	070204-SED-02772-04.00	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.133	U
THT-02773	070204-SED-02773-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	671	
THT-02773	070204-SED-02773-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	2470	
THT-02773	070204-SED-02773-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	524	
THT-02773	070204-SED-02773-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	276	
THT-02773	070204-SED-02773-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	24.5	
THT-02773	070204-SED-02773-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	326	
THT-02773	070204-SED-02773-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.75	
THT-02773	070204-SED-02773-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	76.4	D
THT-02773	070204-SED-02773-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	16.5	
THT-02773	070204-SED-02773-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	65.6	
THT-02773	070204-SED-02773-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	4.46	
THT-02773	070204-SED-02773-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	669	
THT-02773	070204-SED-02773-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	3.99	
THT-02773	070204-SED-02773-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	46.2	
THT-02773	070204-SED-02773-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	801	
THT-02773	070204-SED-02773-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	2970	
THT-02773	070204-SED-02773-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	5.86	
THT-02773	070204-SED-02773-04.90	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	34	
THT-02773	070204-SED-02773-04.90	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	202	
THT-02773	070204-SED-02773-04.90	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	31.3	
THT-02773	070204-SED-02773-04.90	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	25	
THT-02773	070204-SED-02773-04.90	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.63	J
THT-02773	070204-SED-02773-04.90	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	5.36	
THT-02773	070204-SED-02773-04.90	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.526	U
THT-02773	070204-SED-02773-04.90	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	3.2	D
THT-02773	070204-SED-02773-04.90	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.75	J
THT-02773	070204-SED-02773-04.90	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.01	U
THT-02773	070204-SED-02773-04.90	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.819	U
THT-02773	070204-SED-02773-04.90	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	4.64	
THT-02773	070204-SED-02773-04.90	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.873	J
THT-02773	070204-SED-02773-04.90	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.52	J
THT-02773	070204-SED-02773-04.90	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	6.42	
THT-02773	070204-SED-02773-04.90	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	17.5	
THT-02773	070204-SED-02773-04.90	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.9	
THT-02774	070204-SED-02774-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	45.7	
THT-02774	070204-SED-02774-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	206	
THT-02774	070204-SED-02774-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	39.9	
THT-02774	070204-SED-02774-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	26.5	

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
THT-02774	070204-SED-02774-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	2	J
THT-02774	070204-SED-02774-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	9.23	
THT-02774	070204-SED-02774-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.526	U
THT-02774	070204-SED-02774-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	3.19	D
THT-02774	070204-SED-02774-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.21	J
THT-02774	070204-SED-02774-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.8	J
THT-02774	070204-SED-02774-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.785	J
THT-02774	070204-SED-02774-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	11.1	
THT-02774	070204-SED-02774-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.894	J
THT-02774	070204-SED-02774-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.76	J
THT-02774	070204-SED-02774-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	11.6	
THT-02774	070204-SED-02774-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	34.3	
THT-02774	070204-SED-02774-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.41	
THT-02774	070204-SED-02774-02.85	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	35.3	
THT-02774	070204-SED-02774-02.85	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	136	
THT-02774	070204-SED-02774-02.85	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	34.9	
THT-02774	070204-SED-02774-02.85	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	17.5	
THT-02774	070204-SED-02774-02.85	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	4.41	
THT-02774	070204-SED-02774-02.85	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	10.7	
THT-02774	070204-SED-02774-02.85	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.49	U
THT-02774	070204-SED-02774-02.85	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	5.91	D
THT-02774	070204-SED-02774-02.85	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.11	J
THT-02774	070204-SED-02774-02.85	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	2.92	
THT-02774	070204-SED-02774-02.85	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.884	J
THT-02774	070204-SED-02774-02.85	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	9.77	
THT-02774	070204-SED-02774-02.85	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.864	U
THT-02774	070204-SED-02774-02.85	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	2.13	J
THT-02774	070204-SED-02774-02.85	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.635	J
THT-02774	070204-SED-02774-02.85	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	25.9	
THT-02774	070204-SED-02774-02.85	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.18	
SHL-02797	070704-SED-02797-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	22.4	
SHL-02797	070704-SED-02797-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	88.2	B
SHL-02797	070704-SED-02797-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	68.8	B
SHL-02797	070704-SED-02797-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	11.9	B
SHL-02797	070704-SED-02797-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	16.9	
SHL-02797	070704-SED-02797-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	483	
SHL-02797	070704-SED-02797-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.678	U
SHL-02797	070704-SED-02797-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	108	D
SHL-02797	070704-SED-02797-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.58	J
SHL-02797	070704-SED-02797-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	99.5	
SHL-02797	070704-SED-02797-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.659	J
SHL-02797	070704-SED-02797-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	921	
SHL-02797	070704-SED-02797-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	1.59	J
SHL-02797	070704-SED-02797-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	61.3	
SHL-02797	070704-SED-02797-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	993	
SHL-02797	070704-SED-02797-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	2720	
SHL-02797	070704-SED-02797-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	2.16	
SHL-02797	070704-SED-02797-03.60	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.462	J
SHL-02797	070704-SED-02797-03.60	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	12.1	B
SHL-02797	070704-SED-02797-03.60	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.322	JB
SHL-02797	070704-SED-02797-03.60	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.817	JB
SHL-02797	070704-SED-02797-03.60	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.0596	U

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
SHL-02797	070704-SED-02797-03.60	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.662	J
SHL-02797	070704-SED-02797-03.60	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.131	U
SHL-02797	070704-SED-02797-03.60	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.215	J
SHL-02797	070704-SED-02797-03.60	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.13	U
SHL-02797	070704-SED-02797-03.60	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.0834	U
SHL-02797	070704-SED-02797-03.60	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.129	U
SHL-02797	070704-SED-02797-03.60	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.977	J
SHL-02797	070704-SED-02797-03.60	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.0794	U
SHL-02797	070704-SED-02797-03.60	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.057	U
SHL-02797	070704-SED-02797-03.60	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.996	J
SHL-02797	070704-SED-02797-03.60	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	1.23	
SHL-02797	070704-SED-02797-03.60	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.117	U
SHL-02801	070704-SED-02801-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	42.1	
SHL-02801	070704-SED-02801-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	140	B
SHL-02801	070704-SED-02801-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	17.3	B
SHL-02801	070704-SED-02801-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	14.5	B
SHL-02801	070704-SED-02801-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	2.07	J
SHL-02801	070704-SED-02801-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	5.97	
SHL-02801	070704-SED-02801-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.614	U
SHL-02801	070704-SED-02801-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2.32	JD
SHL-02801	070704-SED-02801-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.761	J
SHL-02801	070704-SED-02801-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.23	J
SHL-02801	070704-SED-02801-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.329	J
SHL-02801	070704-SED-02801-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	4.69	
SHL-02801	070704-SED-02801-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.423	J
SHL-02801	070704-SED-02801-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.05	J
SHL-02801	070704-SED-02801-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	6.85	
SHL-02801	070704-SED-02801-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	14	
SHL-02801	070704-SED-02801-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.52	
SHL-02801	070704-SED-02801-03.25	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.295	U
SHL-02801	070704-SED-02801-03.25	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	1.39	JB
SHL-02801	070704-SED-02801-03.25	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.15	JB
SHL-02801	070704-SED-02801-03.25	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.183	JB
SHL-02801	070704-SED-02801-03.25	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.0607	U
SHL-02801	070704-SED-02801-03.25	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.175	J
SHL-02801	070704-SED-02801-03.25	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.138	U
SHL-02801	070704-SED-02801-03.25	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.0401	U
SHL-02801	070704-SED-02801-03.25	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.138	U
SHL-02801	070704-SED-02801-03.25	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.0701	U
SHL-02801	070704-SED-02801-03.25	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.137	U
SHL-02801	070704-SED-02801-03.25	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	0.241	U
SHL-02801	070704-SED-02801-03.25	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.0851	U
SHL-02801	070704-SED-02801-03.25	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.0473	U
SHL-02801	070704-SED-02801-03.25	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.365	J
SHL-02801	070704-SED-02801-03.25	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	0.834	
SHL-02801	070704-SED-02801-03.25	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.0625	U
SHL-02802	070704-SED-02802-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	40.7	
SHL-02802	070704-SED-02802-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	250	B
SHL-02802	070704-SED-02802-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	16.6	B
SHL-02802	070704-SED-02802-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	18.7	B
SHL-02802	070704-SED-02802-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.01	J
SHL-02802	070704-SED-02802-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	4.35	

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
SHL-02802	070704-SED-02802-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.462	U
SHL-02802	070704-SED-02802-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2.23	JD
SHL-02802	070704-SED-02802-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.12	J
SHL-02802	070704-SED-02802-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.796	J
SHL-02802	070704-SED-02802-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.414	J
SHL-02802	070704-SED-02802-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	6.18	
SHL-02802	070704-SED-02802-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.447	J
SHL-02802	070704-SED-02802-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.89	J
SHL-02802	070704-SED-02802-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	6.48	
SHL-02802	070704-SED-02802-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	26.2	
SHL-02802	070704-SED-02802-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.913	
SHL-02802	070704-SED-02802-02.75	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	0.317	U
SHL-02802	070704-SED-02802-02.75	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	2.68	J
SHL-02802	070704-SED-02802-02.75	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.12	U
SHL-02802	070704-SED-02802-02.75	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	0.33	U
SHL-02802	070704-SED-02802-02.75	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.124	U
SHL-02802	070704-SED-02802-02.75	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	0.686	J
SHL-02802	070704-SED-02802-02.75	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.206	U
SHL-02802	070704-SED-02802-02.75	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.208	J
SHL-02802	070704-SED-02802-02.75	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.191	U
SHL-02802	070704-SED-02802-02.75	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.166	U
SHL-02802	070704-SED-02802-02.75	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.196	U
SHL-02802	070704-SED-02802-02.75	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	1.54	J
SHL-02802	070704-SED-02802-02.75	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.224	U
SHL-02802	070704-SED-02802-02.75	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.106	U
SHL-02802	070704-SED-02802-02.75	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	0.804	J
SHL-02802	070704-SED-02802-02.75	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	1.68	
SHL-02802	070704-SED-02802-02.75	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.194	U
SHL-02788	070904-SED-02788-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	28200	*
SHL-02788	070904-SED-02788-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	144000	*
SHL-02788	070904-SED-02788-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	5540	*
SHL-02788	070904-SED-02788-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	9960	*
SHL-02788	070904-SED-02788-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	513	
SHL-02788	070904-SED-02788-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	4830	
SHL-02788	070904-SED-02788-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	4.83	
SHL-02788	070904-SED-02788-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1010	D
SHL-02788	070904-SED-02788-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	298	
SHL-02788	070904-SED-02788-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	961	
SHL-02788	070904-SED-02788-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	13.7	
SHL-02788	070904-SED-02788-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	7210	
SHL-02788	070904-SED-02788-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	2.68	
SHL-02788	070904-SED-02788-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	425	
SHL-02788	070904-SED-02788-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	4820	
SHL-02788	070904-SED-02788-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	8090	
SHL-02788	070904-SED-02788-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	3.59	
SHL-02788	070904-SED-02788-02.40	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	17.3	
SHL-02788	070904-SED-02788-02.40	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	125	
SHL-02788	070904-SED-02788-02.40	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	4.26	
SHL-02788	070904-SED-02788-02.40	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	10.9	
SHL-02788	070904-SED-02788-02.40	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.819	J
SHL-02788	070904-SED-02788-02.40	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	4.04	
SHL-02788	070904-SED-02788-02.40	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.468	U

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
SHL-02788	070904-SED-02788-02.40	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.865	J
SHL-02788	070904-SED-02788-02.40	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.48	U
SHL-02788	070904-SED-02788-02.40	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1.13	J
SHL-02788	070904-SED-02788-02.40	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.47	U
SHL-02788	070904-SED-02788-02.40	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	5.86	
SHL-02788	070904-SED-02788-02.40	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.238	U
SHL-02788	070904-SED-02788-02.40	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.536	J
SHL-02788	070904-SED-02788-02.40	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	3.46	
SHL-02788	070904-SED-02788-02.40	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	1.83	
SHL-02788	070904-SED-02788-02.40	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.203	U
SHL-02789	070904-SED-02789-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	20.6	
SHL-02789	070904-SED-02789-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	106	
SHL-02789	070904-SED-02789-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	17.7	
SHL-02789	070904-SED-02789-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	17.9	
SHL-02789	070904-SED-02789-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.29	J
SHL-02789	070904-SED-02789-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	17.7	
SHL-02789	070904-SED-02789-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.482	U
SHL-02789	070904-SED-02789-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	4.55	
SHL-02789	070904-SED-02789-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.22	J
SHL-02789	070904-SED-02789-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	3.73	
SHL-02789	070904-SED-02789-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	1.09	J
SHL-02789	070904-SED-02789-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	35	
SHL-02789	070904-SED-02789-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	1.36	J
SHL-02789	070904-SED-02789-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	2.82	
SHL-02789	070904-SED-02789-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	34.5	
SHL-02789	070904-SED-02789-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	165	
SHL-02789	070904-SED-02789-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	2.92	
SHL-02789	070904-SED-02789-02.00	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	9.73	
SHL-02789	070904-SED-02789-02.00	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	13.9	
SHL-02789	070904-SED-02789-02.00	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	9.04	
SHL-02789	070904-SED-02789-02.00	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	1.9	J
SHL-02789	070904-SED-02789-02.00	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	2.64	
SHL-02789	070904-SED-02789-02.00	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	46.9	
SHL-02789	070904-SED-02789-02.00	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.221	U
SHL-02789	070904-SED-02789-02.00	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	11.3	
SHL-02789	070904-SED-02789-02.00	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.234	U
SHL-02789	070904-SED-02789-02.00	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	7.64	
SHL-02789	070904-SED-02789-02.00	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.226	U
SHL-02789	070904-SED-02789-02.00	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	86.1	
SHL-02789	070904-SED-02789-02.00	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.168	U
SHL-02789	070904-SED-02789-02.00	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	5.75	
SHL-02789	070904-SED-02789-02.00	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	91	
SHL-02789	070904-SED-02789-02.00	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	293	
SHL-02789	070904-SED-02789-02.00	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.313	U
SHL-02790	070904-SED-02790-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	11.2	
SHL-02790	070904-SED-02790-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	56.2	
SHL-02790	070904-SED-02790-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	9.36	
SHL-02790	070904-SED-02790-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	7.57	
SHL-02790	070904-SED-02790-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	0.681	J
SHL-02790	070904-SED-02790-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	3.3	
SHL-02790	070904-SED-02790-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.211	U
SHL-02790	070904-SED-02790-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	0.956	J

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

Location ID	Field Sample ID	CAS #	Analyte	Result (ng/kg)	Qualifier
SHL-02790	070904-SED-02790-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.651	J
SHL-02790	070904-SED-02790-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.675	J
SHL-02790	070904-SED-02790-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.308	J
SHL-02790	070904-SED-02790-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	3.41	
SHL-02790	070904-SED-02790-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.466	J
SHL-02790	070904-SED-02790-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.52	U
SHL-02790	070904-SED-02790-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	3.15	
SHL-02790	070904-SED-02790-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	12.3	
SHL-02790	070904-SED-02790-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.433	U
SHL-02790	070904-SED-02790-05.00	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	25.5	
SHL-02790	070904-SED-02790-05.00	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	112	
SHL-02790	070904-SED-02790-05.00	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	17.6	
SHL-02790	070904-SED-02790-05.00	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	13.4	
SHL-02790	070904-SED-02790-05.00	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	1.06	J
SHL-02790	070904-SED-02790-05.00	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	4.37	
SHL-02790	070904-SED-02790-05.00	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.331	J
SHL-02790	070904-SED-02790-05.00	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	1.5	J
SHL-02790	070904-SED-02790-05.00	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.02	J
SHL-02790	070904-SED-02790-05.00	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.995	J
SHL-02790	070904-SED-02790-05.00	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.382	U
SHL-02790	070904-SED-02790-05.00	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	5.51	
SHL-02790	070904-SED-02790-05.00	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.632	J
SHL-02790	070904-SED-02790-05.00	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	0.783	U
SHL-02790	070904-SED-02790-05.00	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	6.39	
SHL-02790	070904-SED-02790-05.00	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	20.2	
SHL-02790	070904-SED-02790-05.00	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	0.728	
SHL-02817	070904-SED-02817-00.30	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	43.3	
SHL-02817	070904-SED-02817-00.30	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	280	
SHL-02817	070904-SED-02817-00.30	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	22.5	
SHL-02817	070904-SED-02817-00.30	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	19.8	
SHL-02817	070904-SED-02817-00.30	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	2.37	J
SHL-02817	070904-SED-02817-00.30	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	39.1	
SHL-02817	070904-SED-02817-00.30	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.478	U
SHL-02817	070904-SED-02817-00.30	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	9.17	
SHL-02817	070904-SED-02817-00.30	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	1.22	J
SHL-02817	070904-SED-02817-00.30	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	7.5	
SHL-02817	070904-SED-02817-00.30	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.498	U
SHL-02817	070904-SED-02817-00.30	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	71	
SHL-02817	070904-SED-02817-00.30	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.638	U
SHL-02817	070904-SED-02817-00.30	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	4.83	
SHL-02817	070904-SED-02817-00.30	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	58.4	
SHL-02817	070904-SED-02817-00.30	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	142	
SHL-02817	070904-SED-02817-00.30	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.11	
SHL-02817	070904-SED-02817-03.00	39001-02-0	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	218	
SHL-02817	070904-SED-02817-03.00	3268-87-9	1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	2020	
SHL-02817	070904-SED-02817-03.00	67562-39-4	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	58.9	
SHL-02817	070904-SED-02817-03.00	35822-46-9	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	87.7	
SHL-02817	070904-SED-02817-03.00	55673-89-7	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	2.16	U
SHL-02817	070904-SED-02817-03.00	70648-26-9	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	4.97	
SHL-02817	070904-SED-02817-03.00	39227-28-6	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	0.357	U
SHL-02817	070904-SED-02817-03.00	57117-44-9	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	2.28	J
SHL-02817	070904-SED-02817-03.00	57653-85-7	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	2.58	

TABLE C-2

Sample Results for Summer 2004 Specific Congeners, Vertical Variability  
*Dow MOCA—Tittabawasee River Sediment*

<b>Location ID</b>	<b>Field Sample ID</b>	<b>CAS #</b>	<b>Analyte</b>	<b>Result (ng/kg)</b>	<b>Qualifier</b>
SHL-02817	070904-SED-02817-03.00	72918-21-9	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	1	J
SHL-02817	070904-SED-02817-03.00	19408-74-3	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	0.474	U
SHL-02817	070904-SED-02817-03.00	57117-41-6	1,2,3,7,8-PENTACHLORODIBENZOFURAN	5.11	
SHL-02817	070904-SED-02817-03.00	40321-76-4	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	0.245	U
SHL-02817	070904-SED-02817-03.00	60851-34-5	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	1.38	J
SHL-02817	070904-SED-02817-03.00	57117-31-4	2,3,4,7,8-PENTACHLORODIBENZOFURAN	5.77	
SHL-02817	070904-SED-02817-03.00	51207-31-9	2,3,7,8-TETRACHLORODIBENZOFURAN	19.5	
SHL-02817	070904-SED-02817-03.00	1746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.04	

Data Qualifiers: 'B' - The analyte was found in the associated blank as well as the sample

'D' - Compound was identified in an analysis at a secondary dilution factor

'J' - Indicates value is an estimate

'U' - The specific isomer is reported as non-detected as a valid concentration could not be determined

\*\*- Duplicate analysis not within control limits

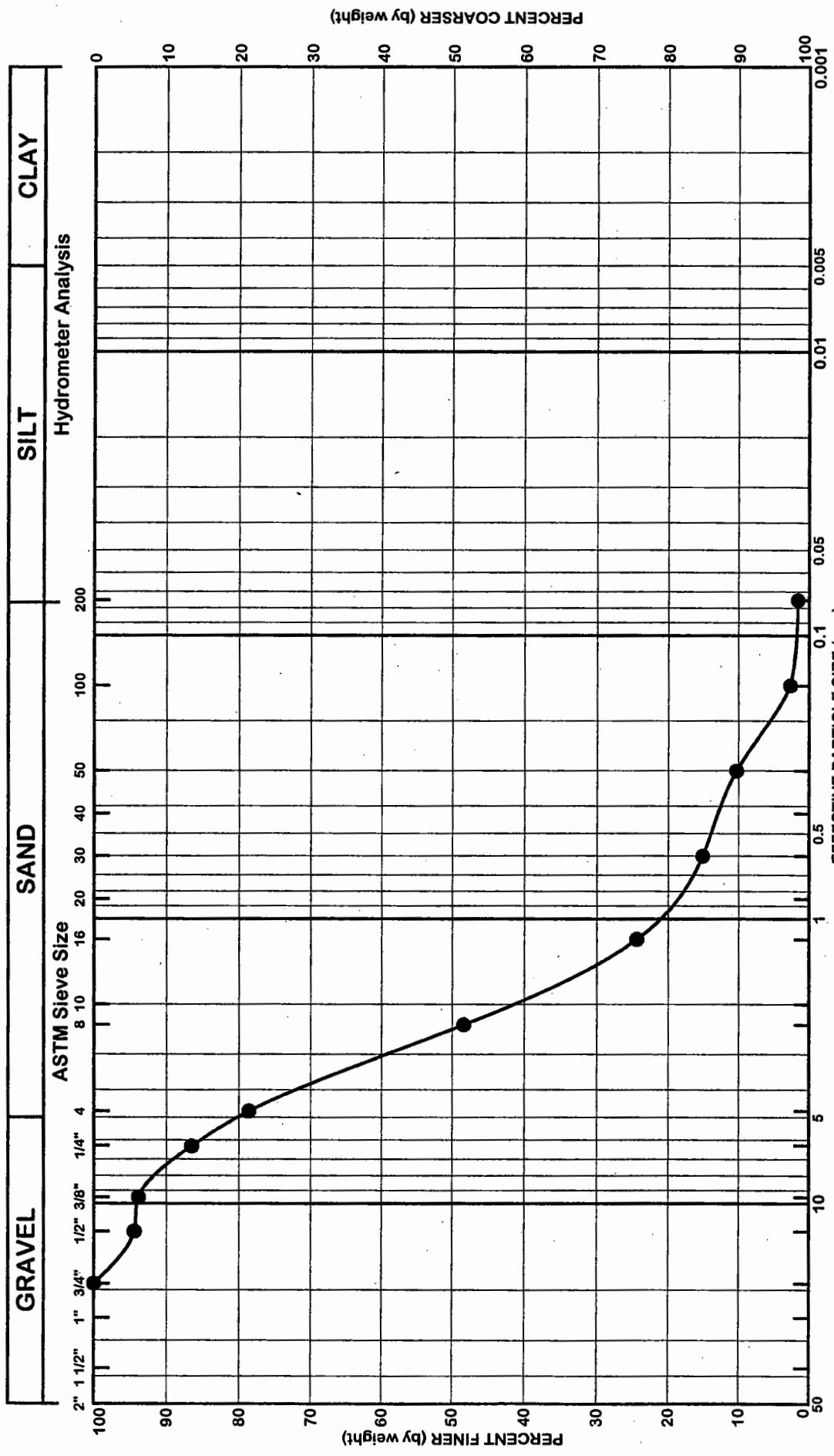
**Appendix D**

**Grain Size Sieve Analysis Results**

---

Sample No.      Identification      Gravel (%)      Sand (%)  
● 20501212401    111803-SED-  
                      0253-2.2      21.4      77.0

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# GRAIN SIZE ANALYSIS

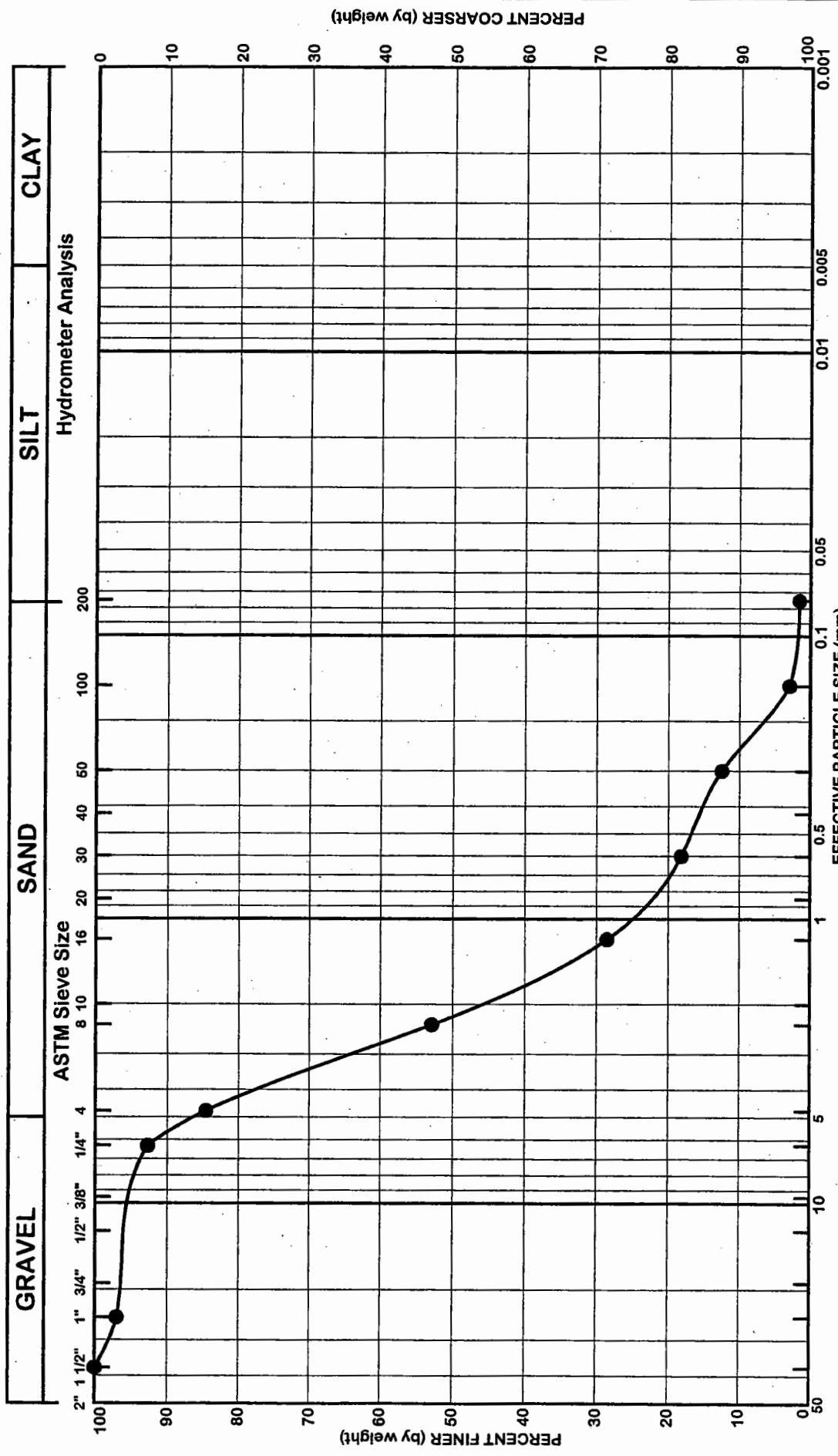
ASTM D422

Soil Testing Engineers, Inc.

File No.: 05-7010  
Date: 01/26/2005

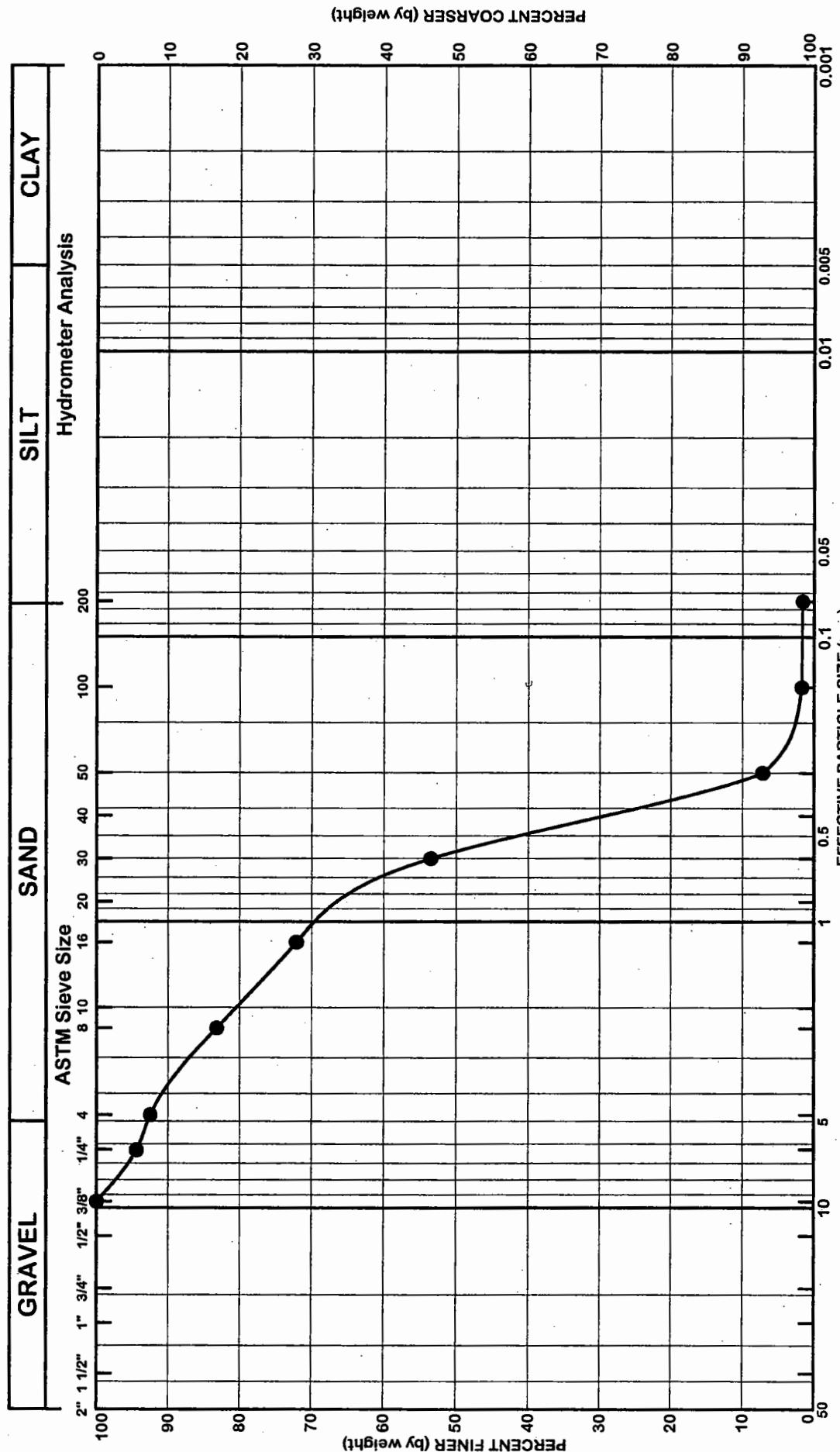
Sample No.      Identification      Gravel (%)      Sand (%)  
● 20501212402    111803-SED-    15.4      83.0  
                      02253-2.2D

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Sample No. Identification Gravel (%) Sand (%)  
● 20501212403 120203-SED- 7.5 90.9  
02239-4.0

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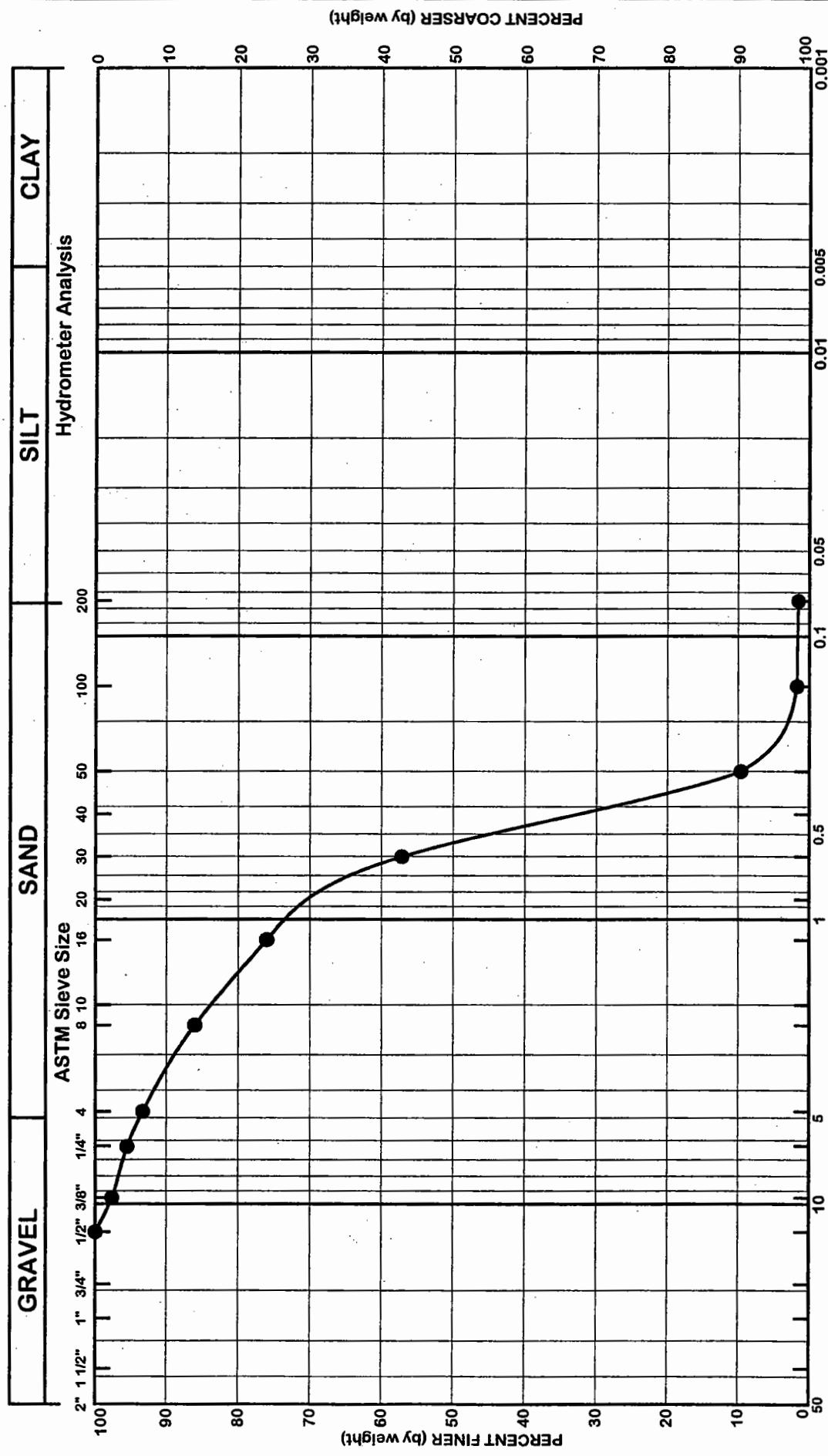
## GRAIN SIZE ANALYSIS

ASTM D422

File No.: 05-7010  
Date: 01/26/2005

Sample No. 20501212404    Identification 120203-SED-022394.0D    Gravel (%) 6.7    Sand (%) 91.7

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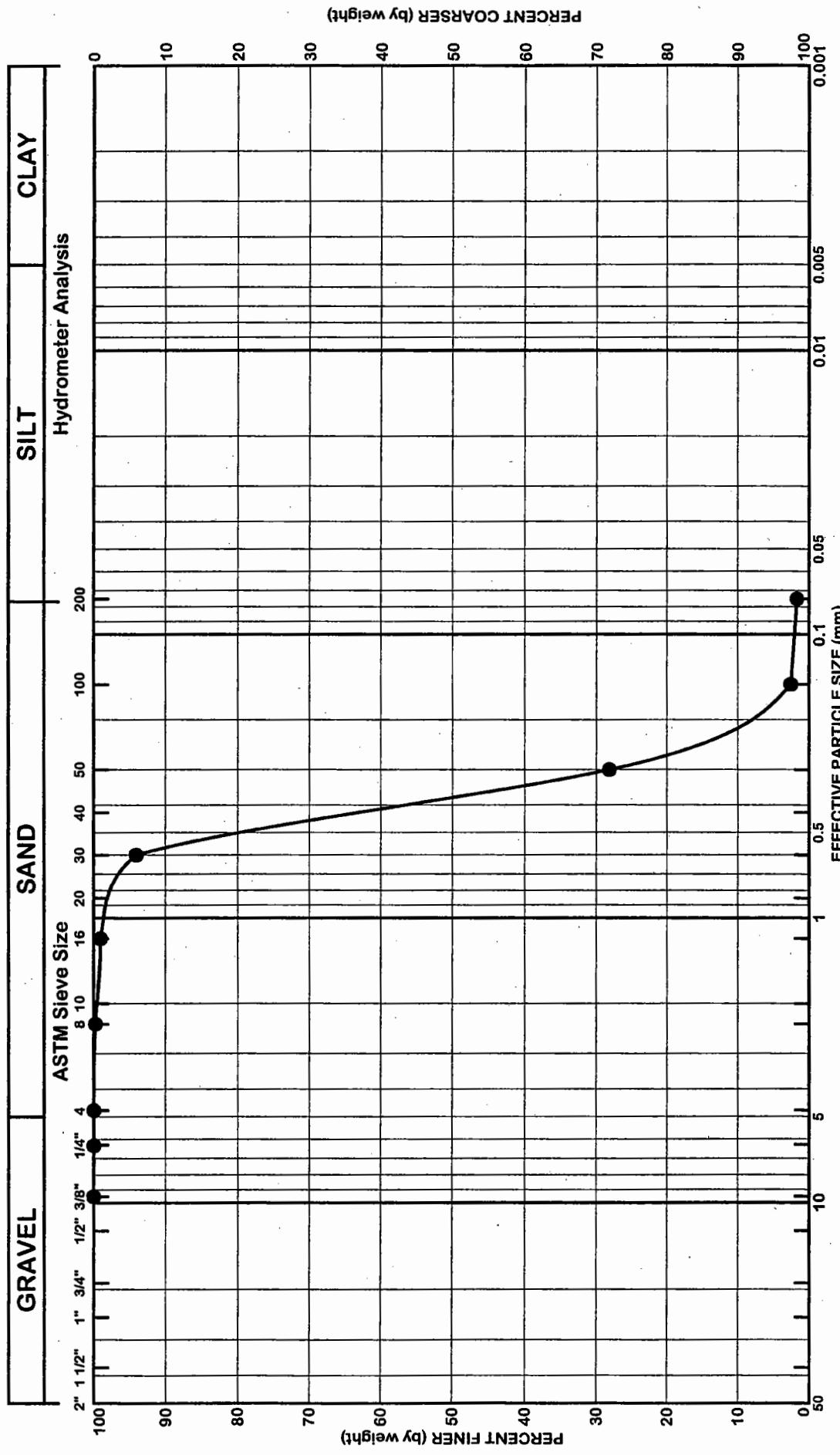
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ASTM D422

File No.: 05-7010  
Date: 01/26/2005

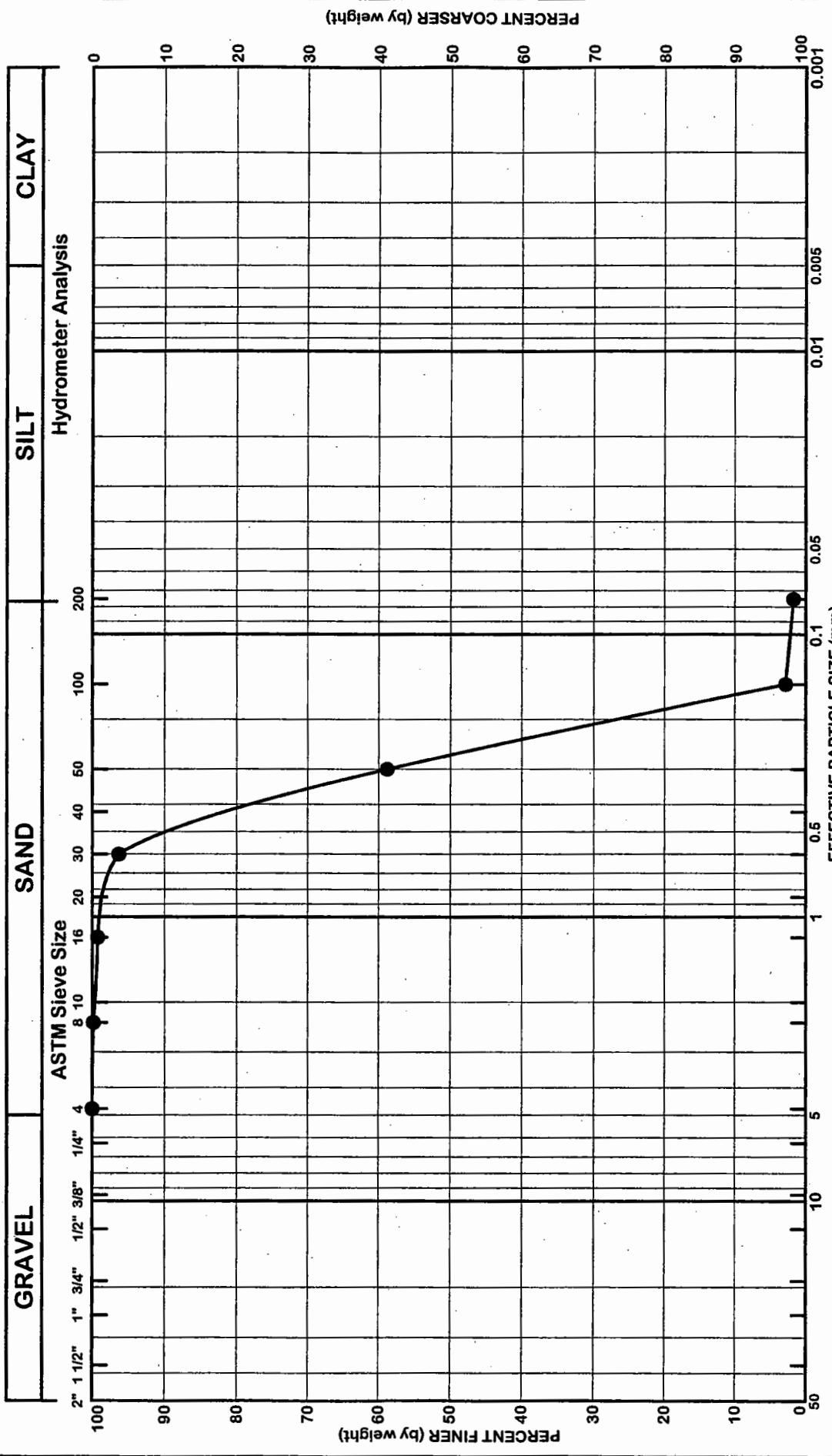
Sample No. 20501212405 Identification 112603-SED-02235-2.4  
● Gravel (%) 0.0 Sand (%) 98.2

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**Sample No.** 20501212406    **Identification** 110603-SED-0234-1.5    **Gravel (%)** 0.0    **Sand (%)** 98.2



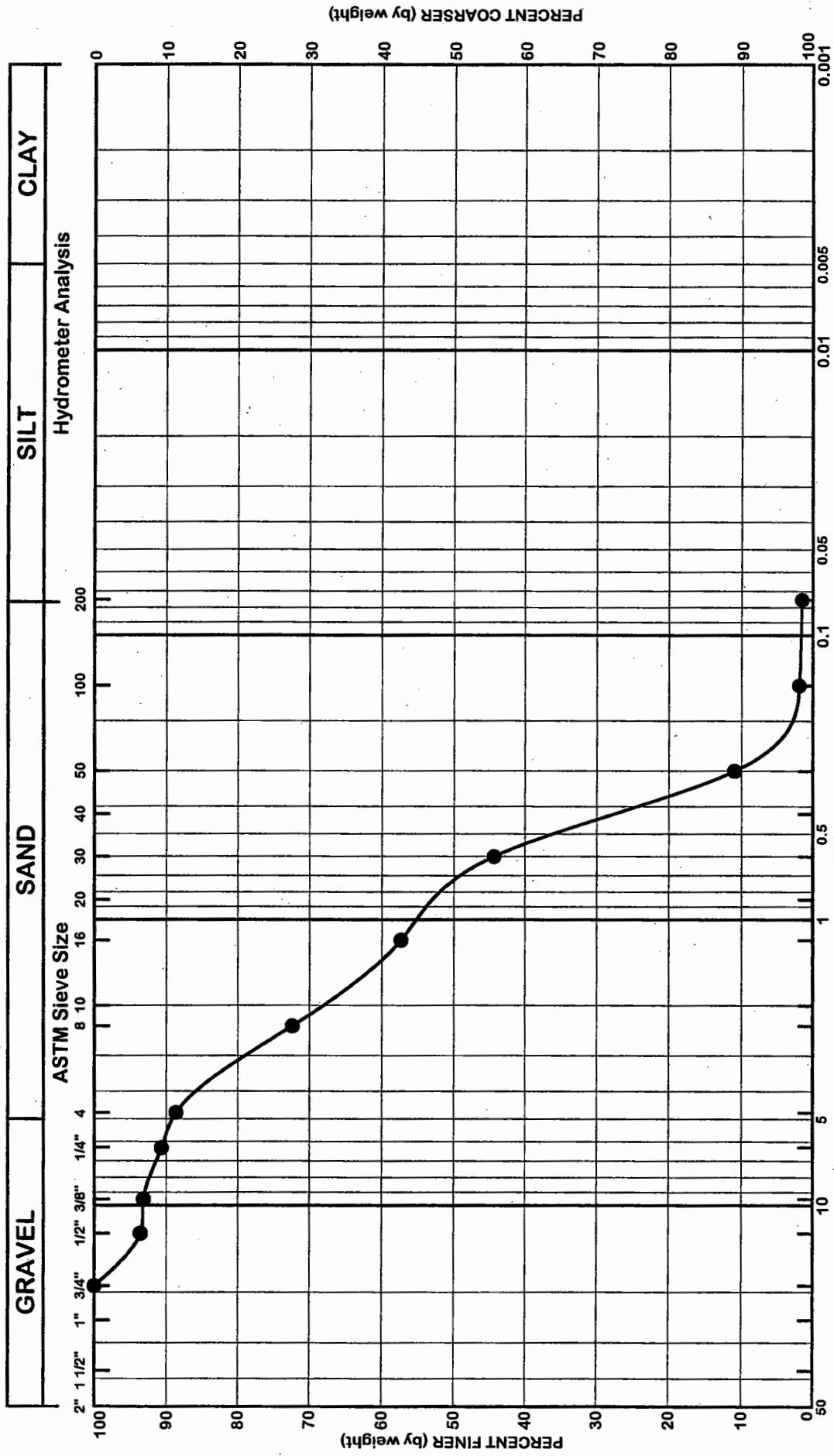
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## GRAIN SIZE ANALYSIS

**File No.:** 05-7010  
**Date:** 01/26/2005

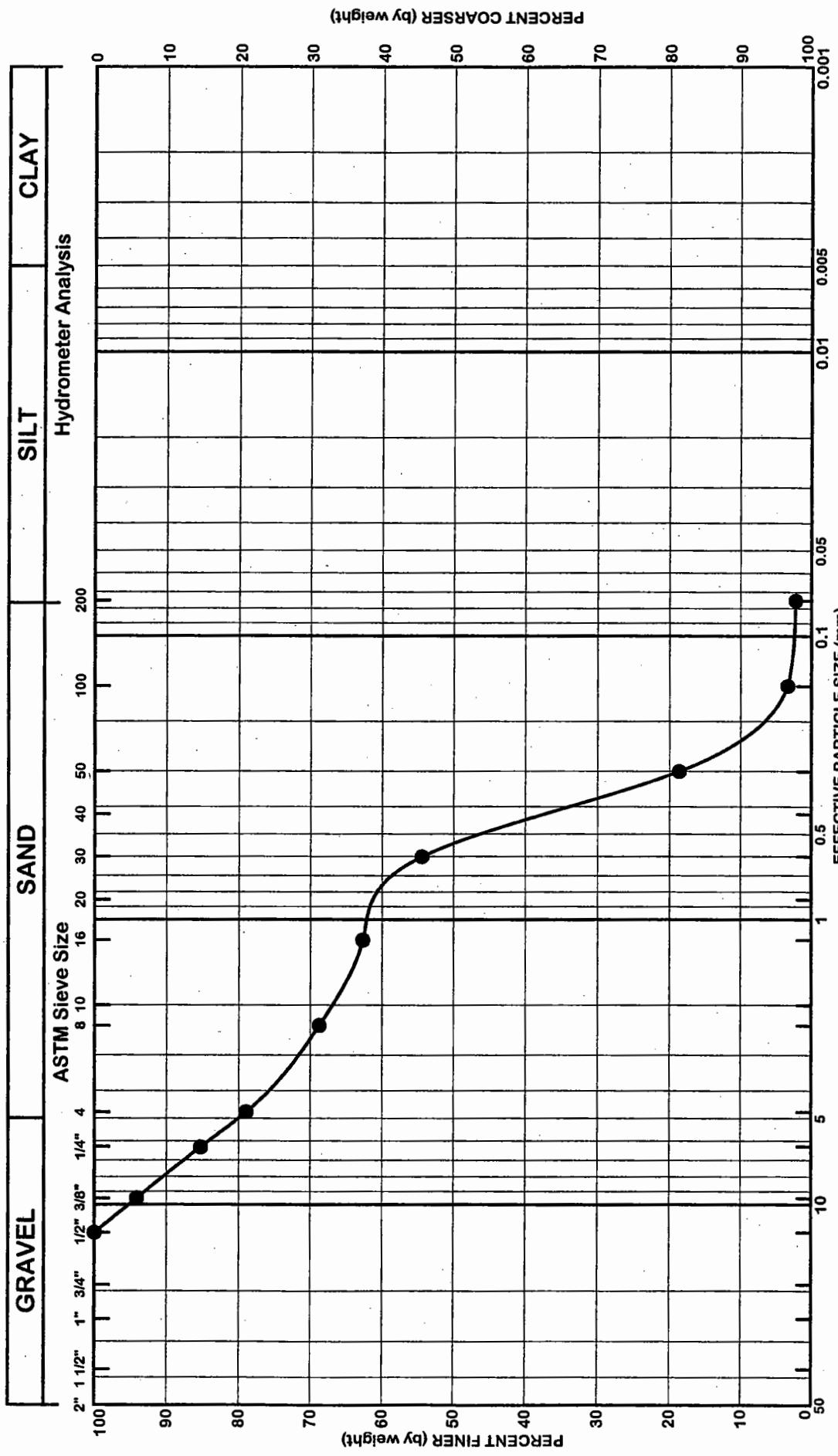
Sample No. ● 20501212407    Identification 112403-SED-02232-3.7    Gravel (%) 11.3    Sand (%) 87.1

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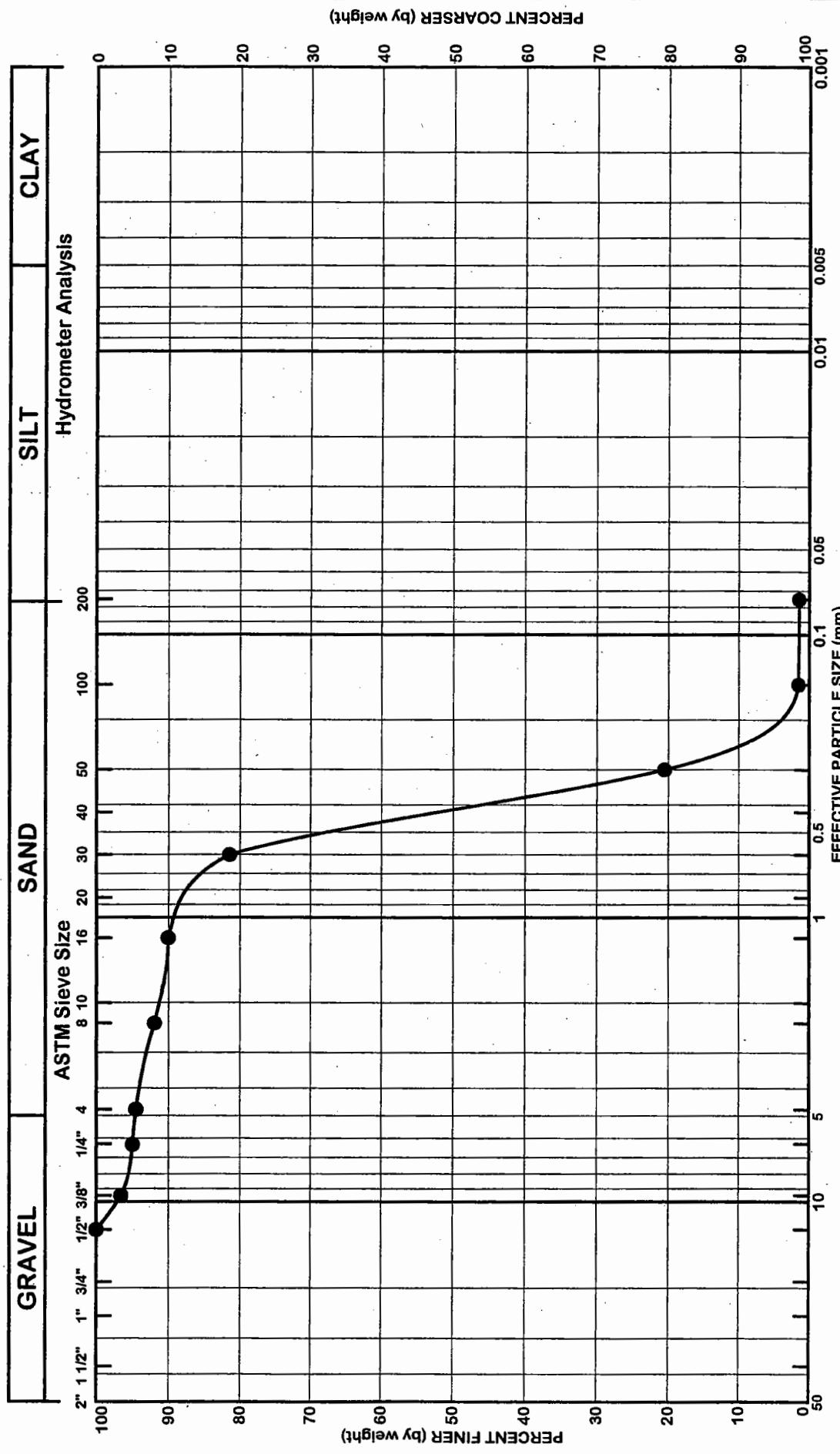
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Sample No. Identification Gravel(%) Sand(%)  
● 20501212408 120803-SED- 21.0 76.7  
02248-0.75



Sample No. Identification Gravel (%) Sand (%)  
● 20501212409 120803-SED- 5.5 93.0  
02247-3.4

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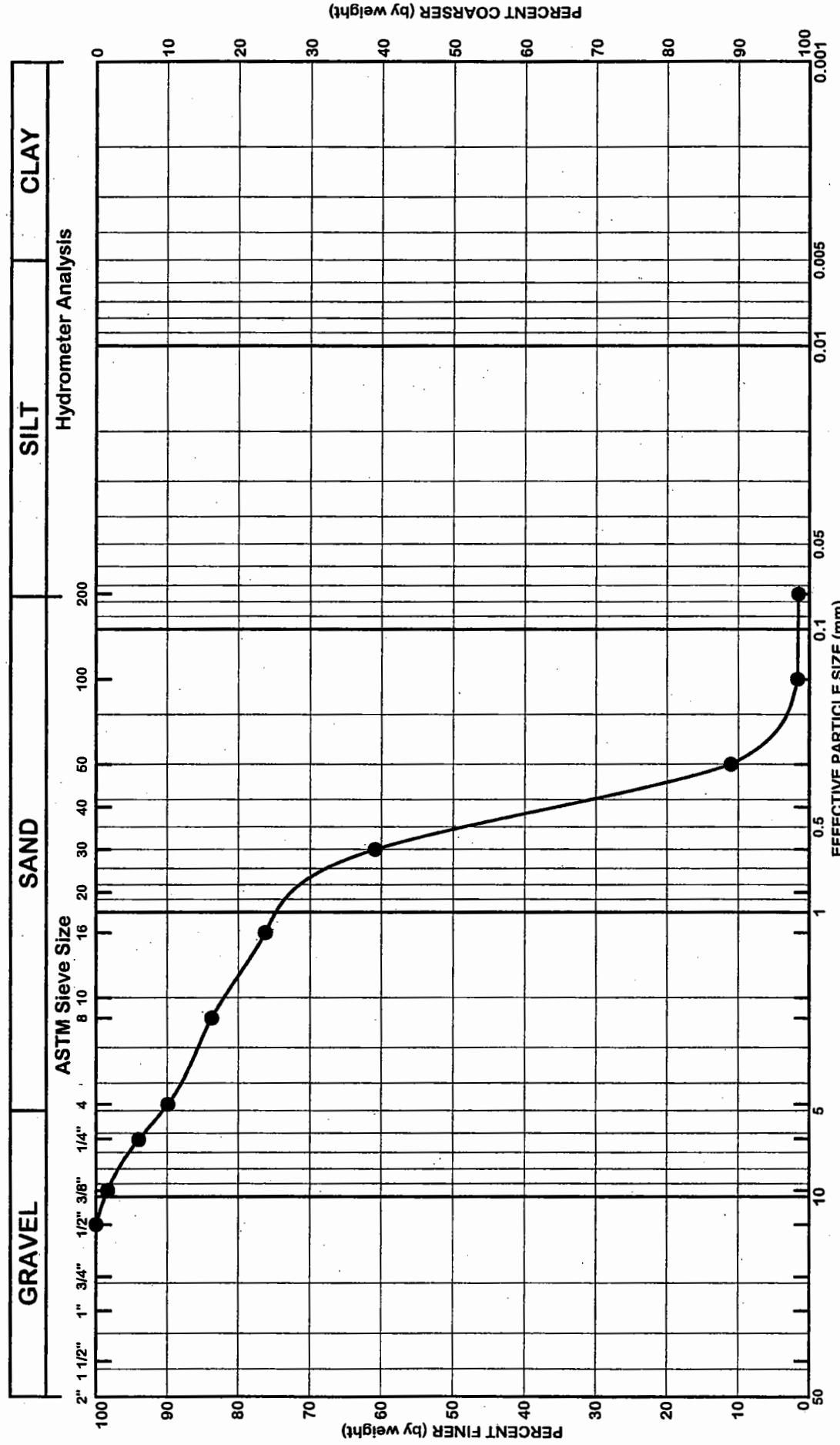
## GRAIN SIZE ANALYSIS

ASTM D422

File No.: 05-7010  
Date: 01/26/2005

Sample No.      Identification      Gravel (%)      Sand (%)  
● 20501212410    111403-SED-  
                      02250-2.3                  10.1      88.4

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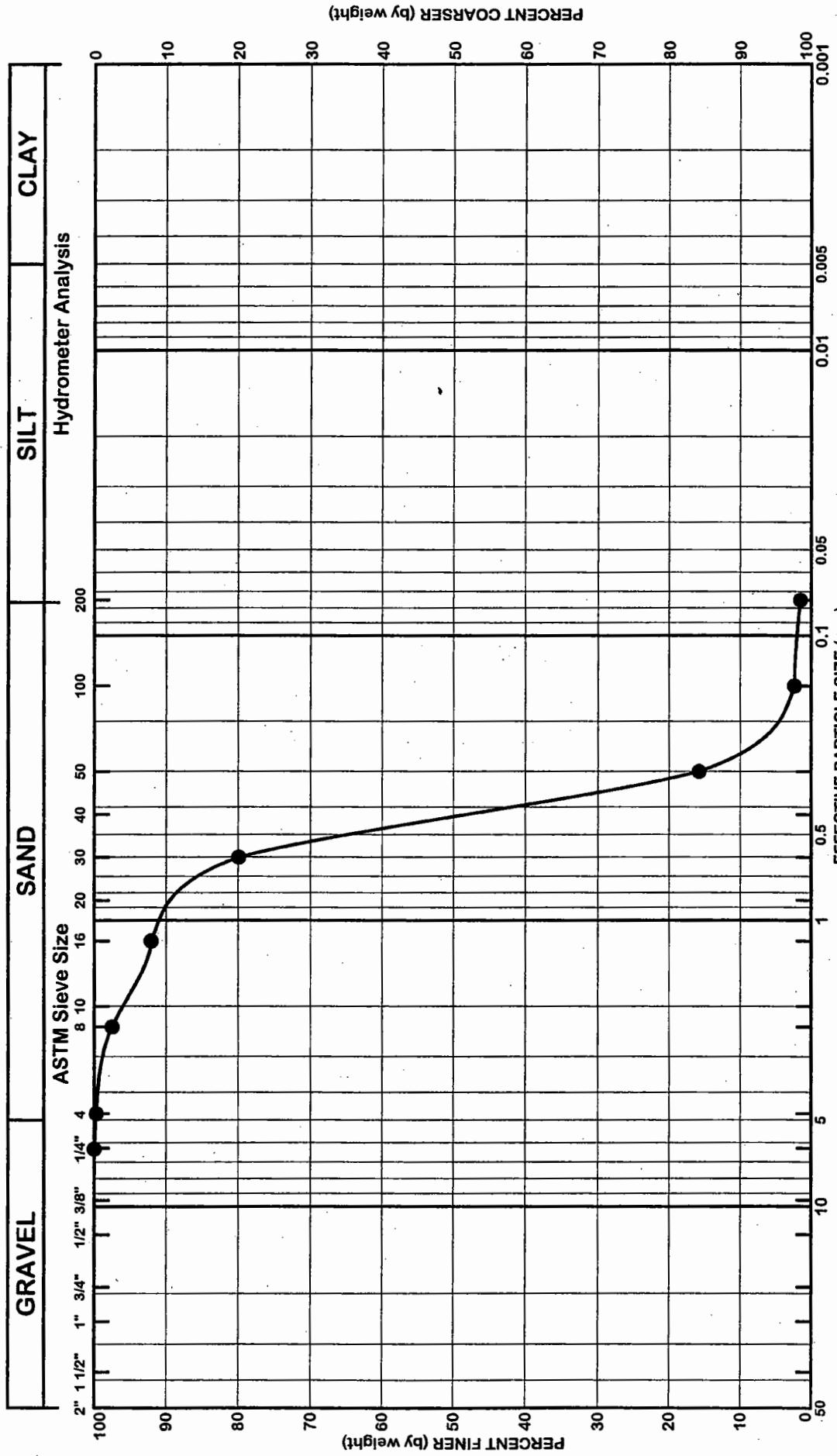
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ASTM D422

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Date: 01/26/2005

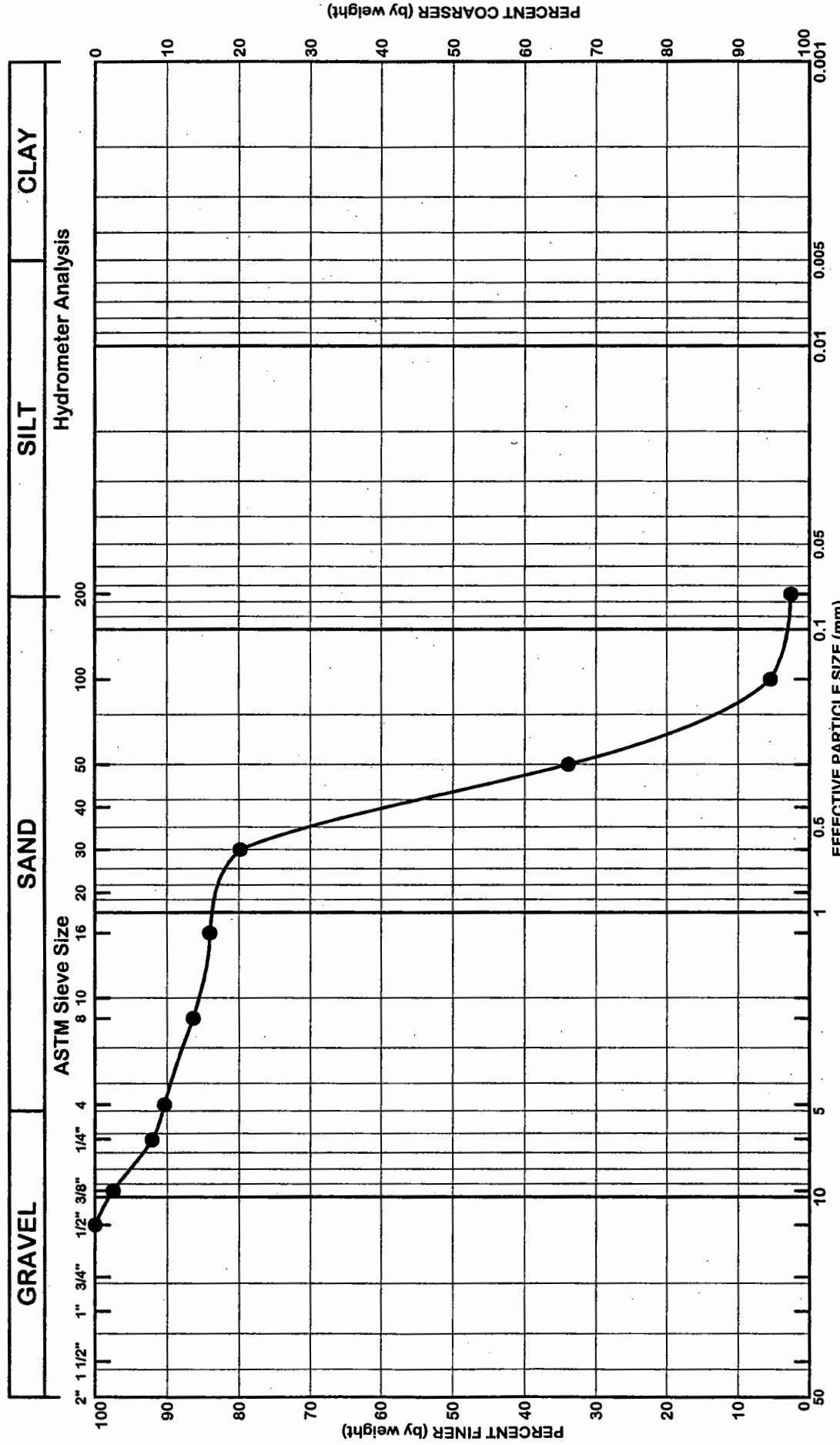
Sample No. Identification Gravel (%) Sand (%)  
 ● 20501212411 120503-SED- 0.3 98.2  
 02246-3.0

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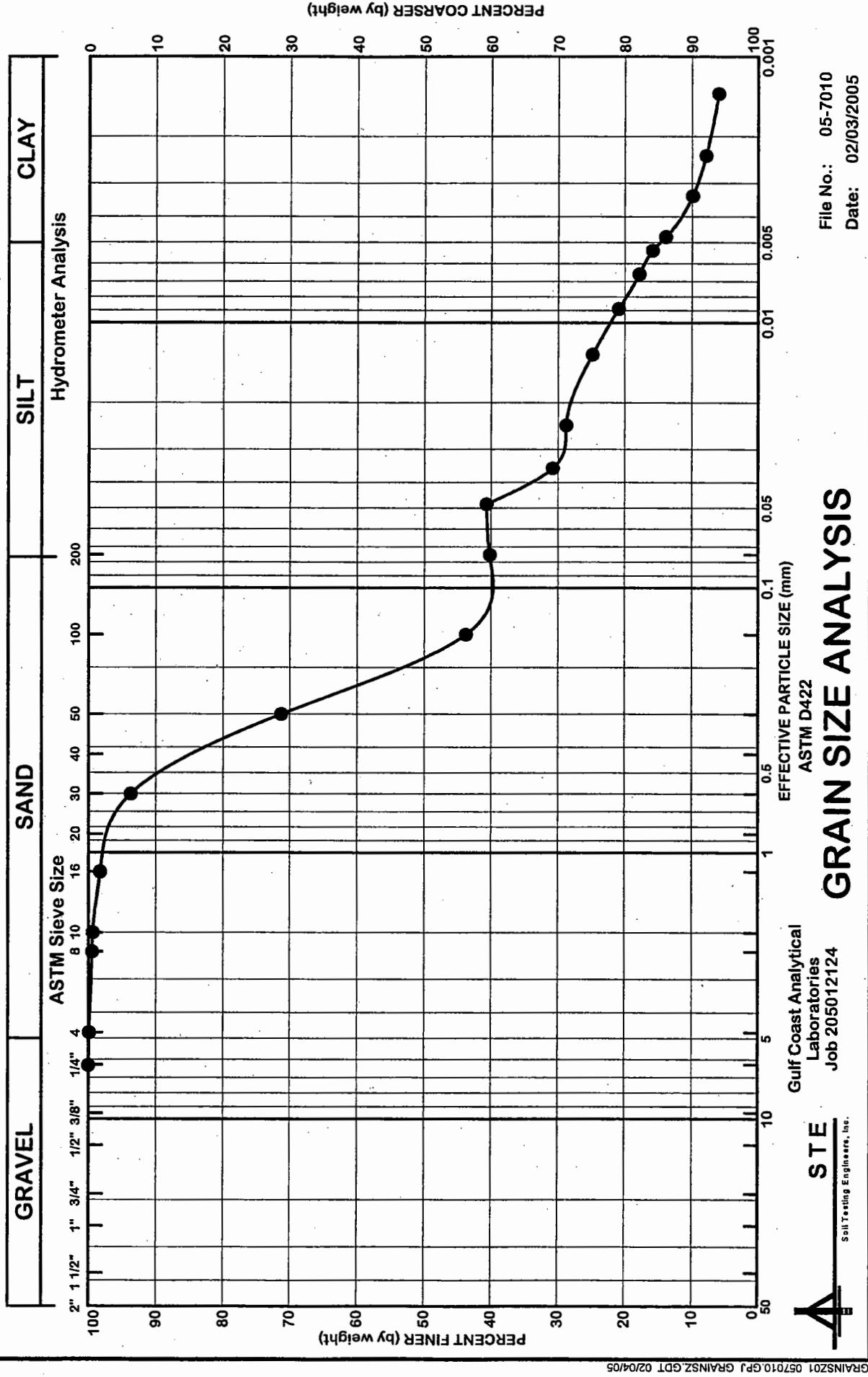
Sample No. ● 20501212412    Identification 121103-SED-  
 02254-1.3    Gravel (%) 9.6    Sand (%) 87.8

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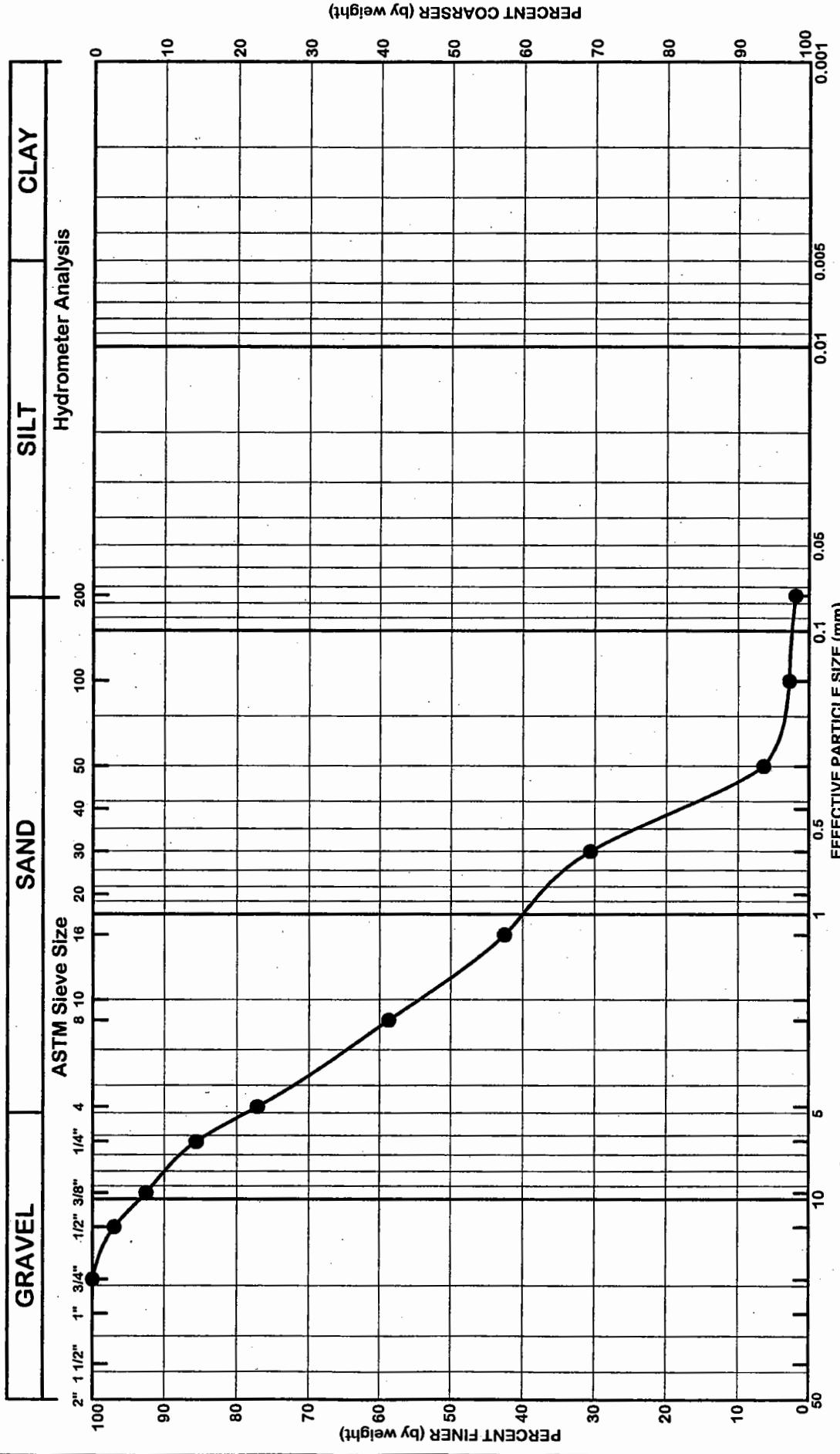
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Sample No. Identification Gravel(%) Sand(%) Silt(%) Clay(%)  
● 20501212413 120403-SED- 0.1 59.7 25.5 14.7  
02243-3.0



Sample No. 20501212414    Identification 110703-SED-  
● 02238-1.6                          Sand (%) 75.2

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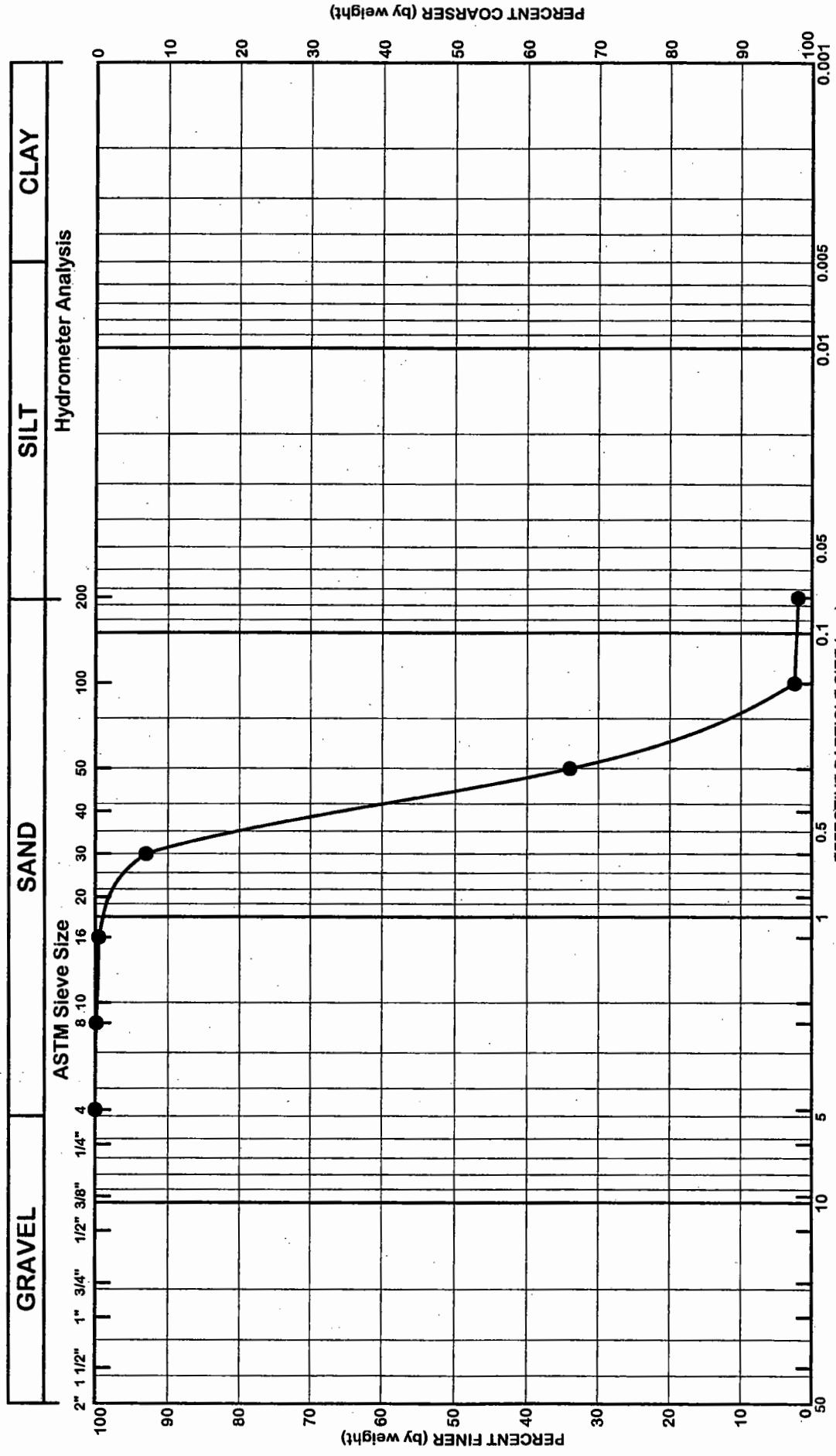
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File No.: 05-7010  
Date: 01/26/2005

Sample No. 20501212415 Identification 120103-SED-02237-3.0 Gravel (%) 0.0 Sand (%) 98.1

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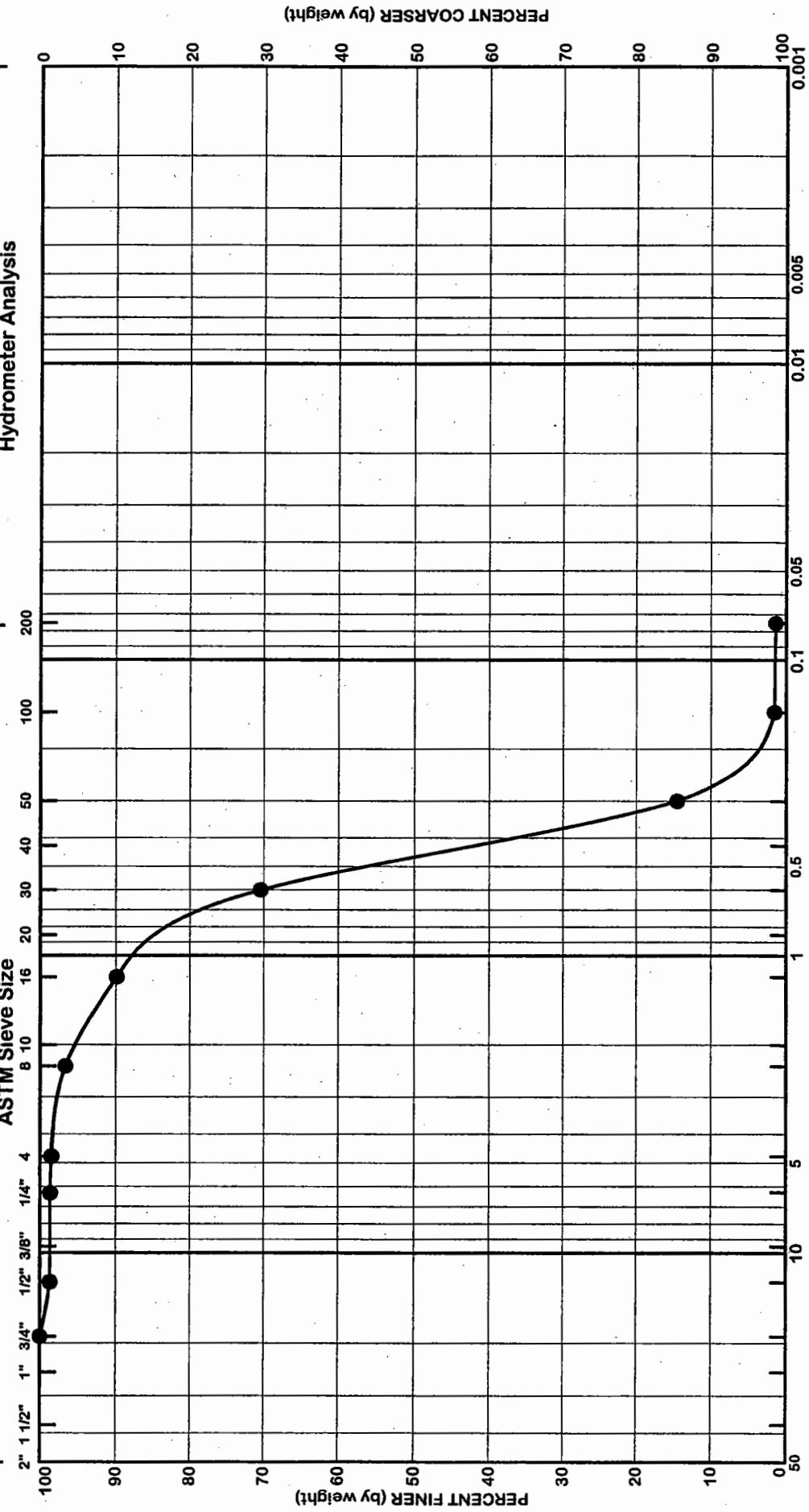


Sample No. Identification 110703-SED-  
● 20501212416 02236-2.0

Gravel (%) Sand (%)  
1.5 97.0

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GRAVEL	SAND	SILT	CLAY
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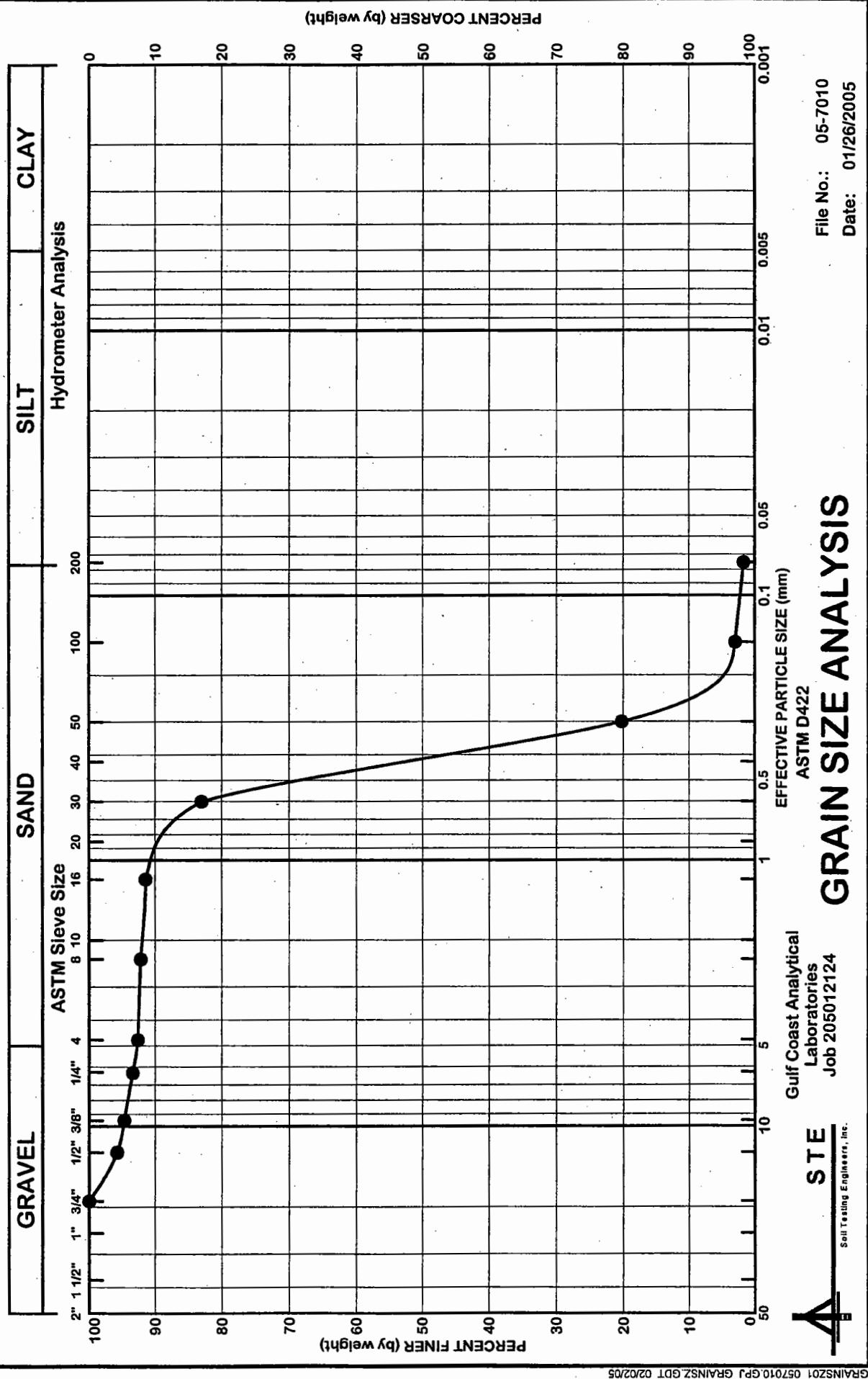
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File No.: 05-7010  
Date: 01/26/2005

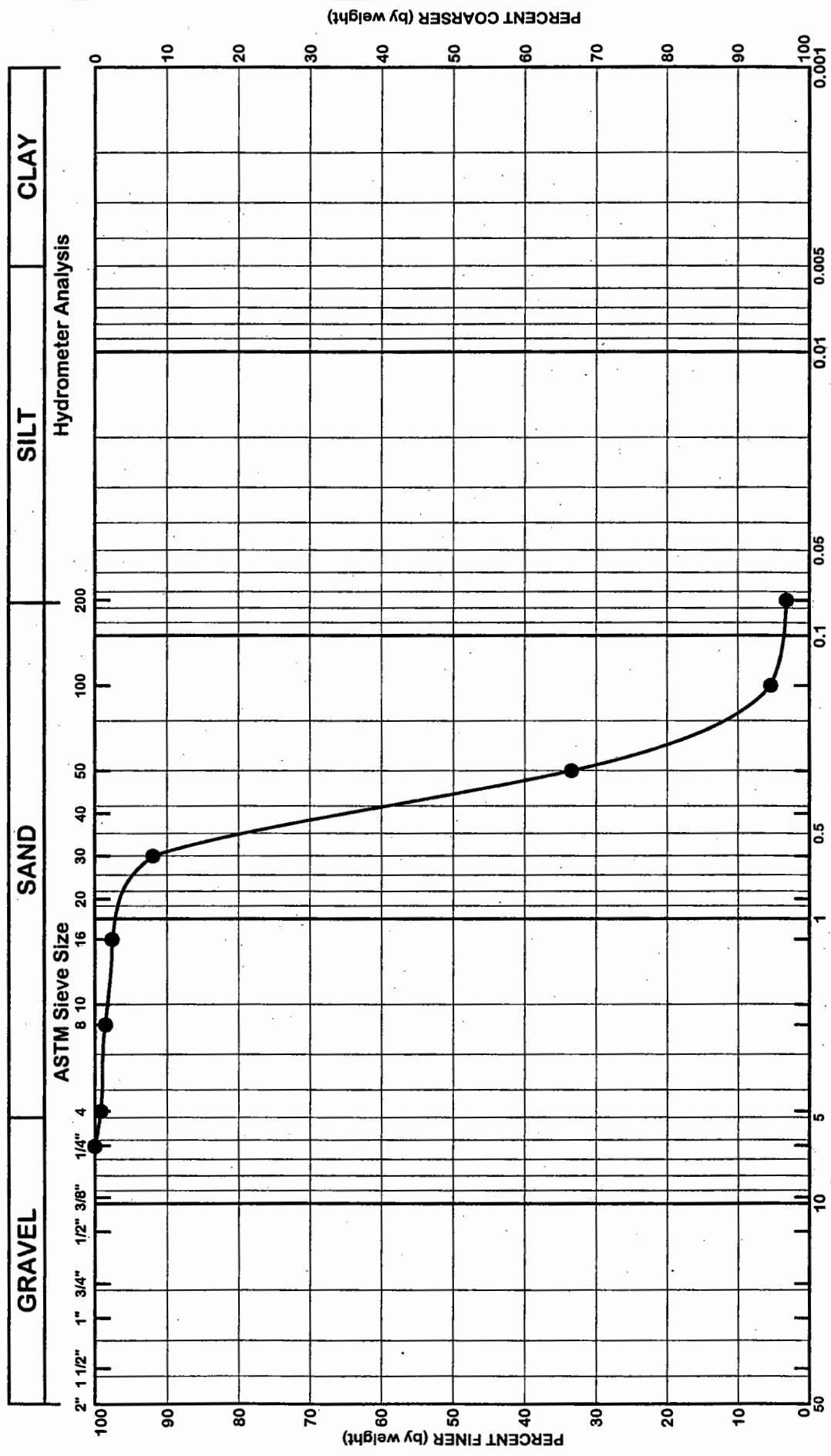
Sample No. Identification Gravel (%) Sand (%)  
● 20501212417 120303-SED- 7.4 90.9  
02242-3.9

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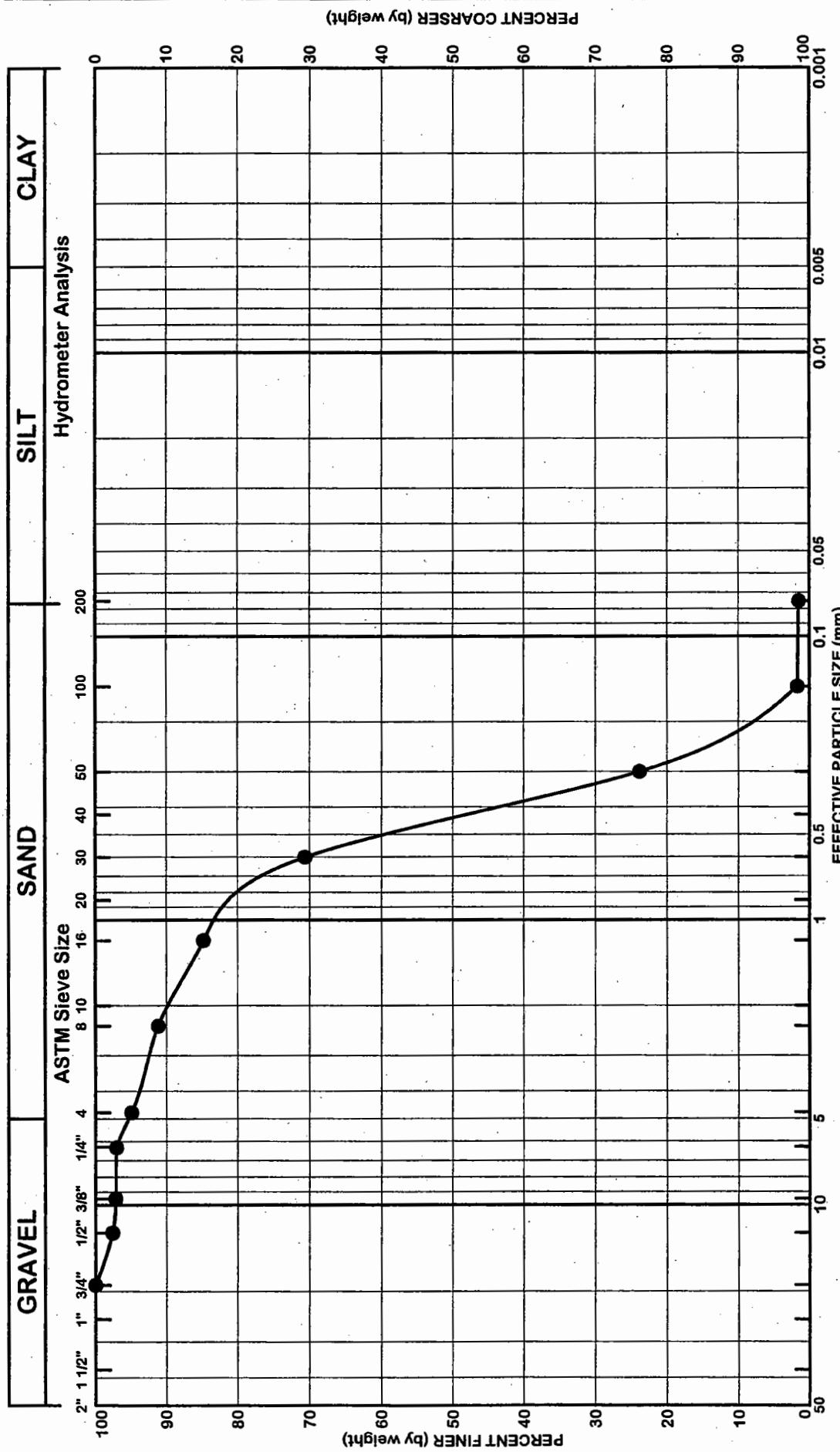
Sample No. 20501212418    Identification 120903-SED-02249-04.1    Gravel (%) 0.8    Sand (%) 95.9

AASHTO Accredited Laboratory  
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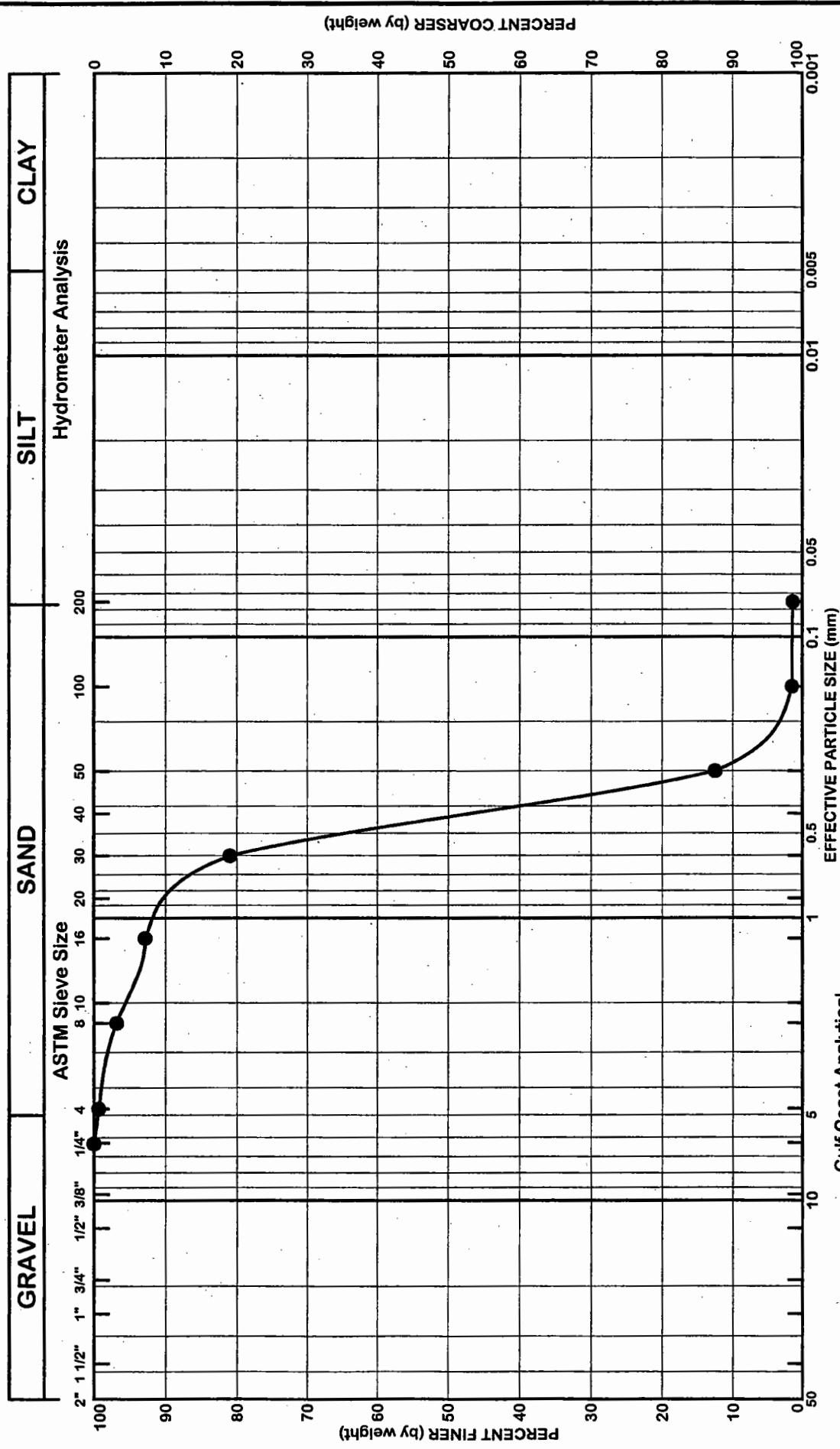
Sample No. Identification Gravel (%) Sand (%)  
● 20501212419 112503-SED- 5.1 93.4  
02233-03.9

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Sample No.	Identification	Gravel (%)	Sand (%)
● 20501212420	120903-SED-0252-02.3	0.7	98.0



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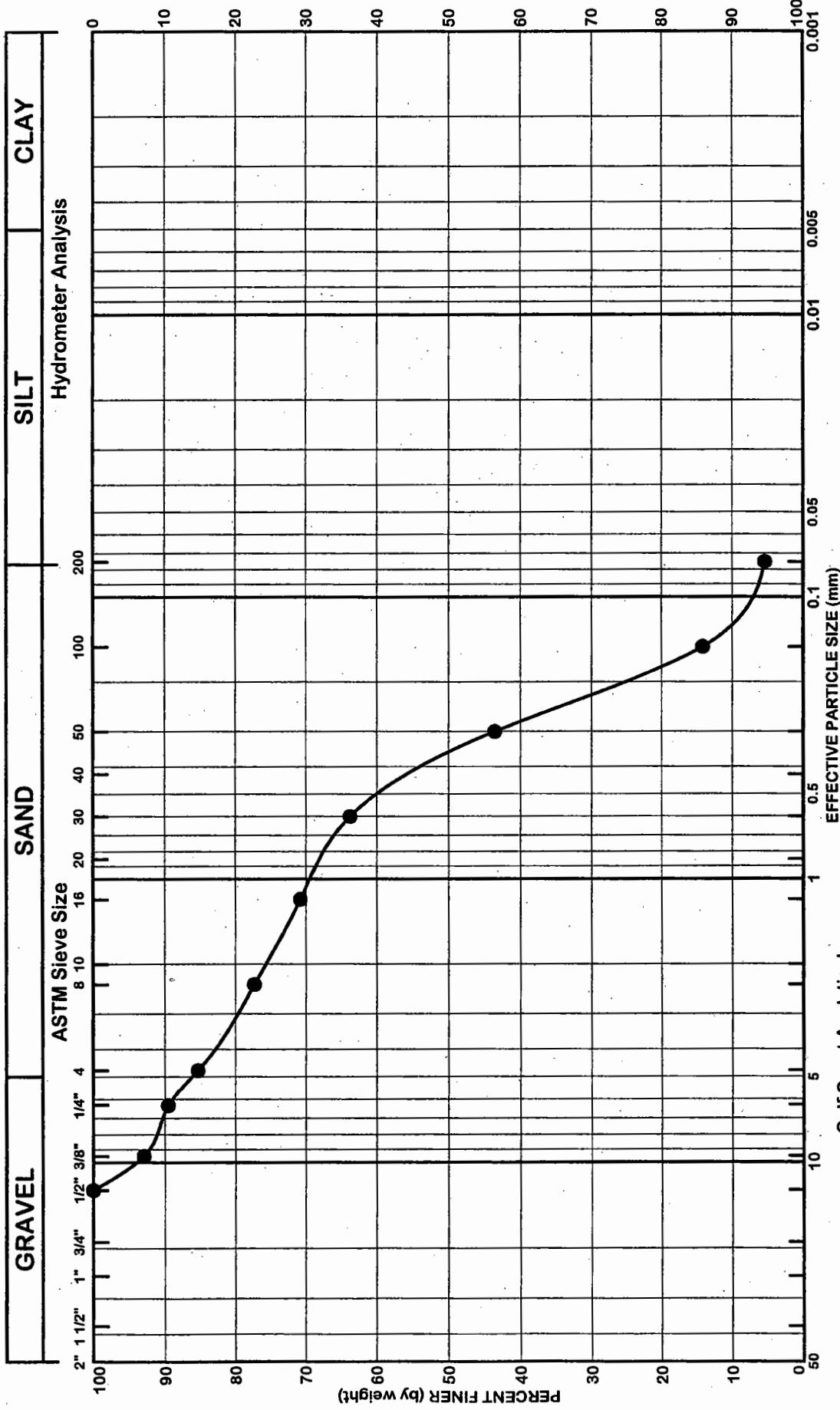
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# GRAIN SIZE ANALYSIS

File No.: 05-7010  
Date: 01/26/2005

Sample No. 20501212421    Identification 111703-SED-02251-02.5

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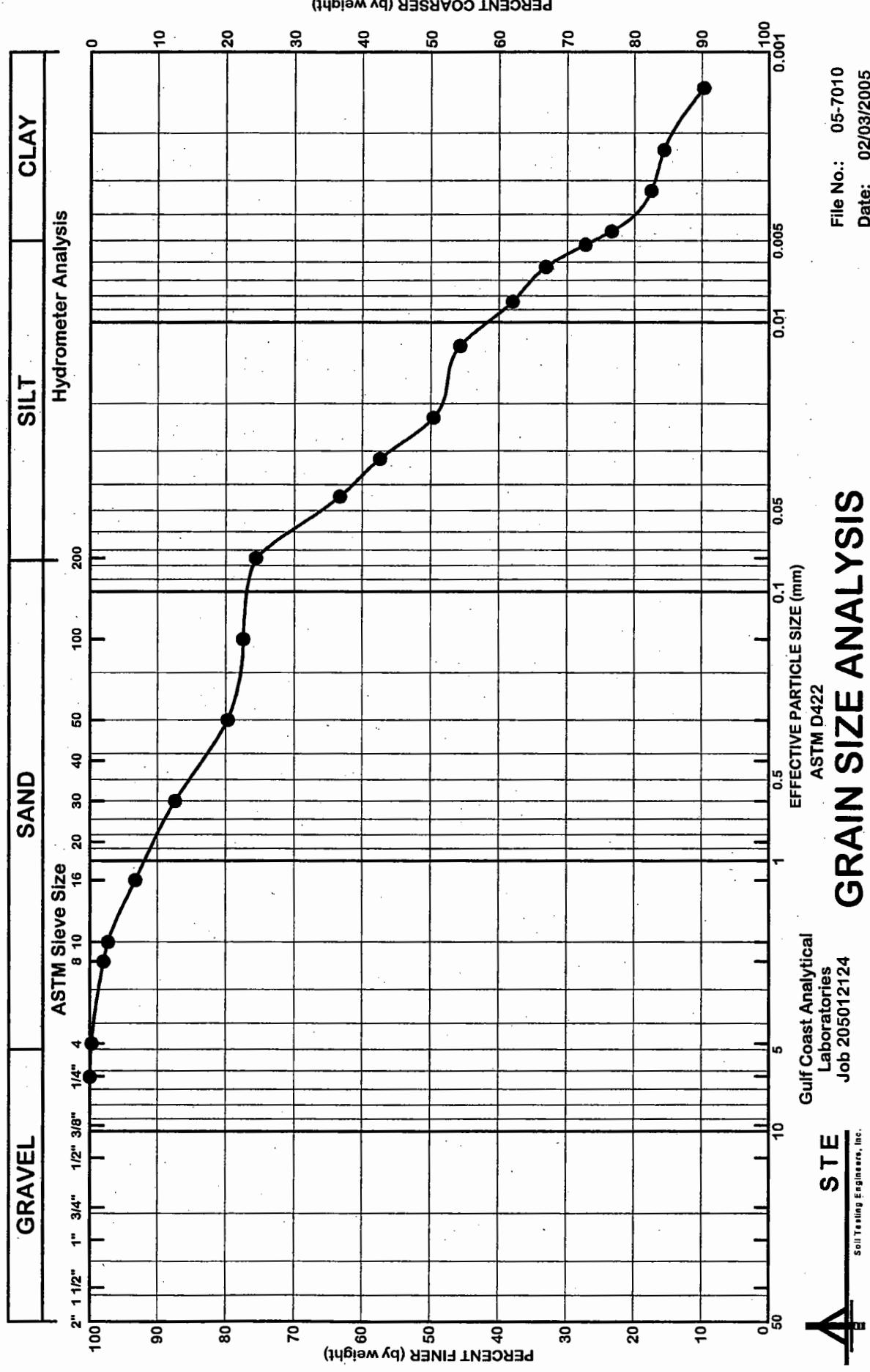
ASTM D422

## GRAIN SIZE ANALYSIS

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Date: 01/26/2005

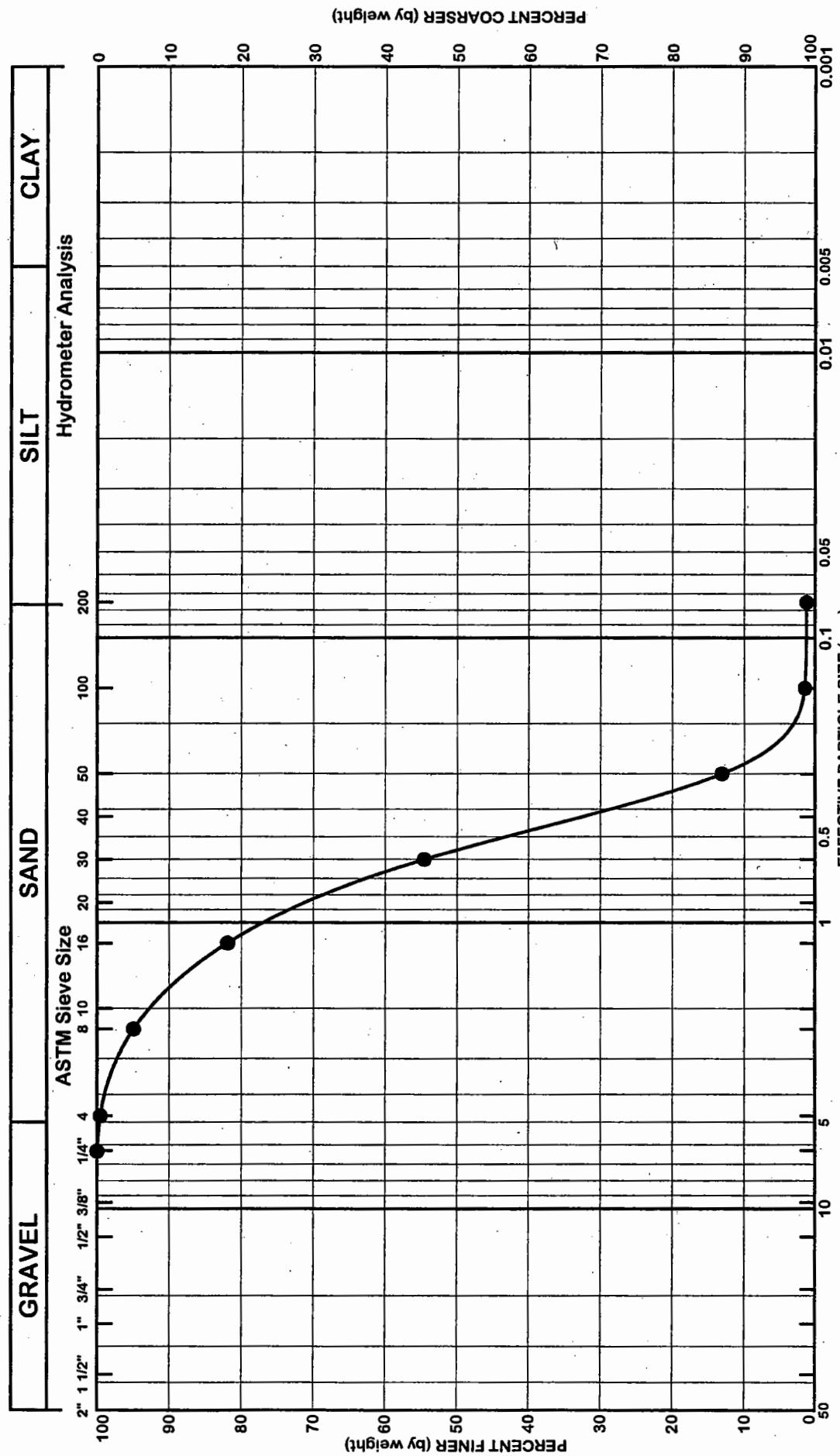
Sample No. 20501212422    Identification 120203-SED-02240-01.8

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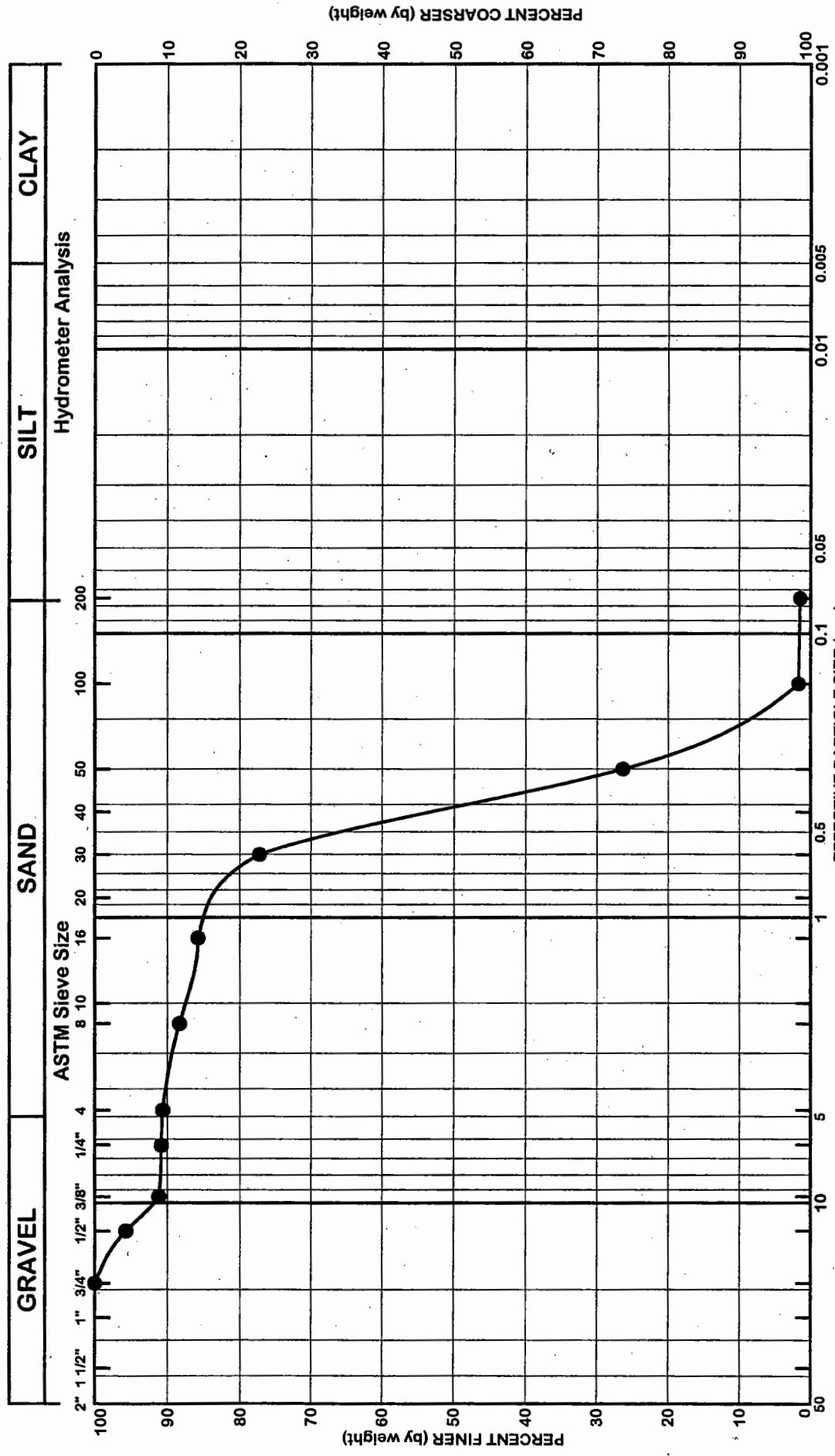
Sample No. Identification Gravel(%) Sand(%)  
● 20501212423 120303-SED- 0.4 98.3  
02241-02.3

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<b>Sample No.</b>	<b>Identification</b>	<b>Gravel (%)</b>	<b>Sand (%)</b>
● 20501212424	120403-SED-02244-03.8	9.3	89.2



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Job 20501212422

**GRAIN SIZE ANALYSIS**

**STE**  
Soil Testing Engineers, Inc.

File No.: 05-7010  
Date: 01/26/2005

**Appendix E**

**Statistical Evaluation Vertical**

**Pair Sediment Comparisons**

---

## APPENDIX E

# Statistical Evaluation – Vertical Pair Sediment Comparisons

---

The following summarizes comparisons of paired surface and subsurface sediment samples from common locations in the Tittabawassee River. As described previously, the objective of this sampling event was to develop a better understanding of the vertical distribution of dioxins and furans in Tittabawassee River sediments using existing sediment cores collected by LTI in the fall of 2003 and CH2M HILL in the summer of 2004. The vertical distribution of dioxin and furan concentrations in sediments were characterized by collecting paired samples from surface sediments (0 to 0.3 ft) and subsurface sediments (bottom 1 ft in the core). Statistical analyses was conducted of these two groups to evaluate differences in concentrations between shallow and deep sediment samples.

## Summary Statistics

A total of 83 sediment samples comprised the population of paired results. Out of these samples, 79 represented paired surface and subsurface results, with one field duplicate. The field duplicate and its parent result were averaged to provide a single result, and these results were to provide 39 sets of paired surface-subsurface sediment samples. The remaining four samples which represented locations with a single depth sampled were excluded from the analysis of paired results. Summary statistics for the two sets of data (surface and subsurface sediments) are shown in Table E-1. Boxplots of the paired [surface and subsurface from the same river location] are displayed in Figure E-1.

## Surface/Subsurface Comparisons

Statistical evaluation was performed to determine if there differences between surface and subsurface groups of samples. The null hypothesis is as follows:

$H_0$ : There is no difference in concentrations between the two groups (surface and subsurface sediments)

The alternate hypothesis is as follows:

$H_a$ : The concentrations in surface sediments are significantly different from those in subsurface sediments.

The 39 paired records were tested as independent groups using both parametric t-test and nonparametric Mann-Whitney U-test. Use of the parametric t-test is based on the assumption that the two data sets are normally distributed. A goodness-of-fit test was not performed on the data to evaluate the assumption of normality.

Nonparametric test results indicate statistically significant differences between concentrations in surface and subsurface sediments at  $p=0.006$ . The parametric methods, while indicating no statistically significant differences using either paired or unpaired tests, were adversely affected by the extremely high standard deviation in the subsurface samples

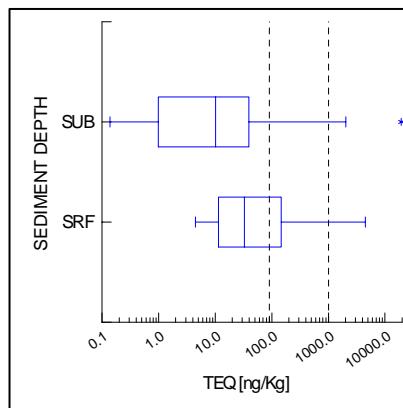
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[SHL-02233 at mile 18.2 from the Dow facility]. However, even using the subset of samples with the anomalous result removed would likely exhibit a more consistent and elevated level of TEQ in surface sediments over the stretch sampled. Based on these results, the null hypothesis would be rejected, and the alternate hypothesis (concentrations in surface and subsurface samples are significantly different) would be accepted.

**Table E-1**  
 Summary Statistics of Surface and Subsurface Sediments  
*Dow-MOCA Tittabawassee River Sediment Evaluation*

Statistic	Concentration in Sediment (ppt TEQ)	
	Surface	Subsurface
N	39	39
Minimum	4.5	0.1
Maximum	4,517.4	19,398
Median	32.6	10.2
Mean	333.5	616.2
95% Lower Confidence Limit	56	-392
95% Upper Confidence Limit	611.1	1,624.4
Standard Deviation	856.2	3,110.1
Coefficient of Variation	2.57	5.05

**Figure E-1**  
 Boxplots of TEQ in Sediments  
*Dow-MOCA Tittabawassee River Sediment Evaluation*



Notes:  
 SUB - Subsurface sediment  
 SRF - Surface sediment

# **Tittabawassee River Sediment Vertical Characterization Sampling and Analysis Plan**

Prepared for  
**The Dow Chemical Company**

December 2004

**CH2MHILL**

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# Abbreviations and Acronyms

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°C	degrees Centigrade
ANOVA	analysis of variance
ASTM	American Society for Testing and Materials
bgs	below ground surface
CCR	<i>Tittabawassee River and Floodplain Current Conditions Report</i>
CSM	conceptual site model
Dow	The Dow Chemical Company
DQO	data quality objective
EPA	U.S. Environmental Protection Agency when used with method (e.g., EPA Method 8260)
Facility	Dow Michigan Operations-Midland Plant
Field SOP	<i>Field Standard Operating Procedures</i>
GPS	global positioning system
L	Liter
MDEQ	Michigan Department of Environmental Quality
mL	Milliliter
MOCA	Midland Offsite Corrective Action
MS/MSD	matrix spike/matrix spike duplicate
oz	Ounce
PCB	polychlorinated biphenyl
PCOI	potential contaminants of interest
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
RI	remedial investigation
SAP	sampling and analysis plan
SOP	standard operating procedure
SVOC	semivolatile organic compound
TAL	target analyte list
TOC	total organic carbon
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

# 1 Introduction

---

This Tittabawassee River Sediment Vertical Characterization Sampling and Analysis Plan (SAP) presents the project approach and sampling program for characterizing the vertical distribution of dioxins and furans in sediment cores that were obtained from Tittabawassee River sediments during investigations conducted in 2003 and 2004. Such characterization will provide information on the nature and extent of dioxin and furan contamination within the river sediments, help refine the current understanding of the fate and transport conceptual model, and provide data that may be used to support possible future actions.

## 1.1 Vertical Characterization Objectives

The objective of the investigation associated with this SAP is to gather chemical and physical data to better understand the vertical distribution of dioxins and furans in Tittabawassee River sediment using existing soil cores.

## 1.2 Sources of Sediment Cores

All of the physical and chemical data associated with this SAP will be obtained from existing sediment cores, currently being held in frozen storage. These sediment cores were collected during 2003 and 2004 as part of the Tittabawassee River Probing and Coring Study (LTI 2004) and the Sediment Dioxin/Furan Concentration Variability Study (CH2M HILL 2004d). Two phases of investigation were associated with the study, as described in Sections 1.2.1 and 1.2.2.

### 1.2.1 2003 Tittabawassee Sediment Sampling

An investigation was conducted of the sediments in the Tittabawassee River in the Poling and Coring Study for Characterization of Sediment Type and Thickness of Unconsolidated Deposits (LTI, 2004) with field work conducted in late 2003. The objectives of this study were to improve the understanding of solids deposition and transport through the river system and provide preliminary data supporting an assessment of the stability of river and floodplain sediments. This study included the collection of 193 cores from 69 transects to provide a representation of sediment conditions along the length of the river, from the river downstream of Dow to its confluence with the Saginaw River. Spacing between transects varied between  $\frac{1}{4}$  mile and one mile. All sediment cores were examined to characterize sediment thickness and lithology. Twenty-three of the sediment cores, representing an even distribution of center, left, and right channel locations were collected for laboratory analysis. The results of the laboratory analysis were reported in the Tittabawassee River Sediment Dioxin/Furan Concentration Variability report (CH2M HILL 2004d). These sediment core locations are shown in Figure 1-1. During sediment core collection, measurements of depth to water, sediment penetrated and sediment recovered measurements were recorded. A summary of these results is presented in Table 1-1.

Following their collection, all cores were maintained and frozen in a vertical position. In the spring of 2004, the upper 0.3 feet was sectioned from each core using a hacksaw to cut through the frozen core liner. The samples were then placed in appropriate sample containers supplied by a laboratory, and shipped for dioxin and furan analysis. The remainder of each sediment core was maintained in frozen storage.

### 1.2.2 2004 Tittabawassee Sediment Sampling Event

Two surface sediment samples collected during the 2003 event exhibited significantly higher total toxic equivalent (TEQ) concentrations than other samples collected during this period. These two sample locations (THT-02245 and SHL-02235) became the focal point for the design of the summer 2004 sediment sampling event.

The objective of the 2004 sampling event was to collect sufficient data to evaluate surface sediment variability in the two areas of elevated dioxins/furans measured in the Tittabawassee River sediment collected in 2003. To meet this objective, a series of sediment cores were collected at logarithmically increasing distances (approximately 3, 30, 100, 330, and 980 feet) from the sample location with the elevated concentration. Sample analysis was to take place in phases, with results from the closest proximal samples evaluated prior to determining which (if any) additional samples would be analyzed.

Sampling to evaluate sediment variability in areas of elevated dioxins/furans was performed on July 1 and 2, and July 7 through 9. This effort included the collection of 35 sediment cores of varying length, but no greater than 5 feet, in accordance with the *Core Sediment Sampling Field SOP* (CH2M HILL, 2004). During sediment core collection, the depth to water, depth of sediment penetrated, and sediment recovered measurements were recorded. A summary of these results is presented in Table 1-2. Figures 1-2 and 1-3 show the locations of the cores collected in 2004.

All sediment cores were maintained in vertical orientation and transferred to the sampling warehouse in Midland for storage in a sample freezer, also in the vertical orientation. After all of the sediment cores were collected and frozen, the samples planned for initial analysis were processed. This was accomplished using a hacksaw to cut the frozen core liners to separate the top 0.3-foot interval. In total, 13 cores were processed in this manner. The remaining portions of these cores, as well as the cores from which no samples were collected, remain frozen for potential future analysis.

## 1.3 Sampling and Analysis Plan Organization

This SAP is organized as follows:

- Section 1 presents an introduction to the Tittabawassee River study area and identifies the project objectives.
- Section 2 presents the data quality objectives, sample design, plan for collecting sediment samples from the frozen cores, and the analyses to be performed on the samples
- Section 3 describes the methods to be used in evaluating the data to understand the vertical distribution of dioxins and furans in the sediment cores

- Section 4 describes the data validation and management procedures.
- Section 5 identifies relevant health and safety plan information.
- Section 6 lists references cited in this SAP.

**Table 1-1**

**2003 Sediment Core Information**

Tittabawassee River Sediment Core Vertical Characterization Sampling and Analysis Plan

Dow Midland Offsite Corrective Action Program

<b>Station ID</b>	<b>Water Depth (ft)</b>	<b>Sediment Recovered (ft)</b>
DOW-02253	3	3.67
DOW-02254	3.75	3
FRE-02247	3	3.5
FRE-02248	5	2.42
FRE-02249	7.5	3
FRE-02250	4	3
MIC-02251	8.5	1.58
MIC-02252	2.5	4
SHI-02232	3	1.8
SHL-02233	7	2.3
SHL-02234	3	3.9
SHL-02235	3.75	3
SHL-02236	0	3.8
SHL-02237	2	3
SHL-02238	3.75	3
SHL-02239	3	3.4
SHL-02240	5.5	0.8
THT-02241	8	4.1
THT-02242	4	2.25
THT-02243	2	1.58
THT-02244	4	2.3
THT-02245	5.5	0.83
THT-02246	7.75	1.3

**Table 1-2****2004 Sediment Core Information**

Tittabawassee River Sediment Core Vertical Characterization Sampling and Analysis Plan  
Dow Midland Offsite Corrective Action Program

<b>Station ID</b>	<b>Water Depth (ft)</b>	<b>Sediment Penetrated (ft)</b>	<b>Sediment Recovered (ft)</b>	<b>Percent Recovery</b>
SHL-02788	4	3	2.4	80%
SHL-02789	3.75	2.5	2	80%
SHL-02790	5	2.4	1.5	63%
SHL-02791	5.25	3.25	2.75	85%
SHL-02792	5.5	2.5	2.3	92%
SHL-02793	5	2	1.5	75%
SHL-02794	5	NR	2.7	-
SHL-02795	4.9	3	3	100%
SHL-02796	3.5	NR	2.5	-
SHL-02797	4.25	3.5	3.6	1.03%
SHL-02798	4.5	3.5	3.25	93%
SHL-02799	6.1	2	1.25	63%
SHL-02800	5.25	5.25	2.4	46%
SHL-02801	4.5	3.5	3.25	93%
SHL-02802	3.5	3	2.75	92%
SHL-02803	4.3	3.75	3.75	100%
SHL-02804	4.9	NR	2.3	-
SHL-02816	3.5	3.5	2.75	79%
SHL-02817	3.75	3.7	3	81%
SHL-02818	3.25	4	2.6	65%
THT-02772	6.6	4.5	4	89%
THT-02773	4.9	3.5	3.1	89%
THT-02774	2.85	3.5	3.1	89%
THT-02775	3.7	3	2.55	85%
THT-02776	5	4	3.45	86%
THT-02777	3	5	3.9	78%
THT-02778	12.1	1.5	1.25	83%
THT-02779	3.3	4.7	4	85%

**Table 1-2**

**2004 Sediment Core Information**

Tittabawasee River Sediment Core Vertical Characterization Sampling and Analysis Plan

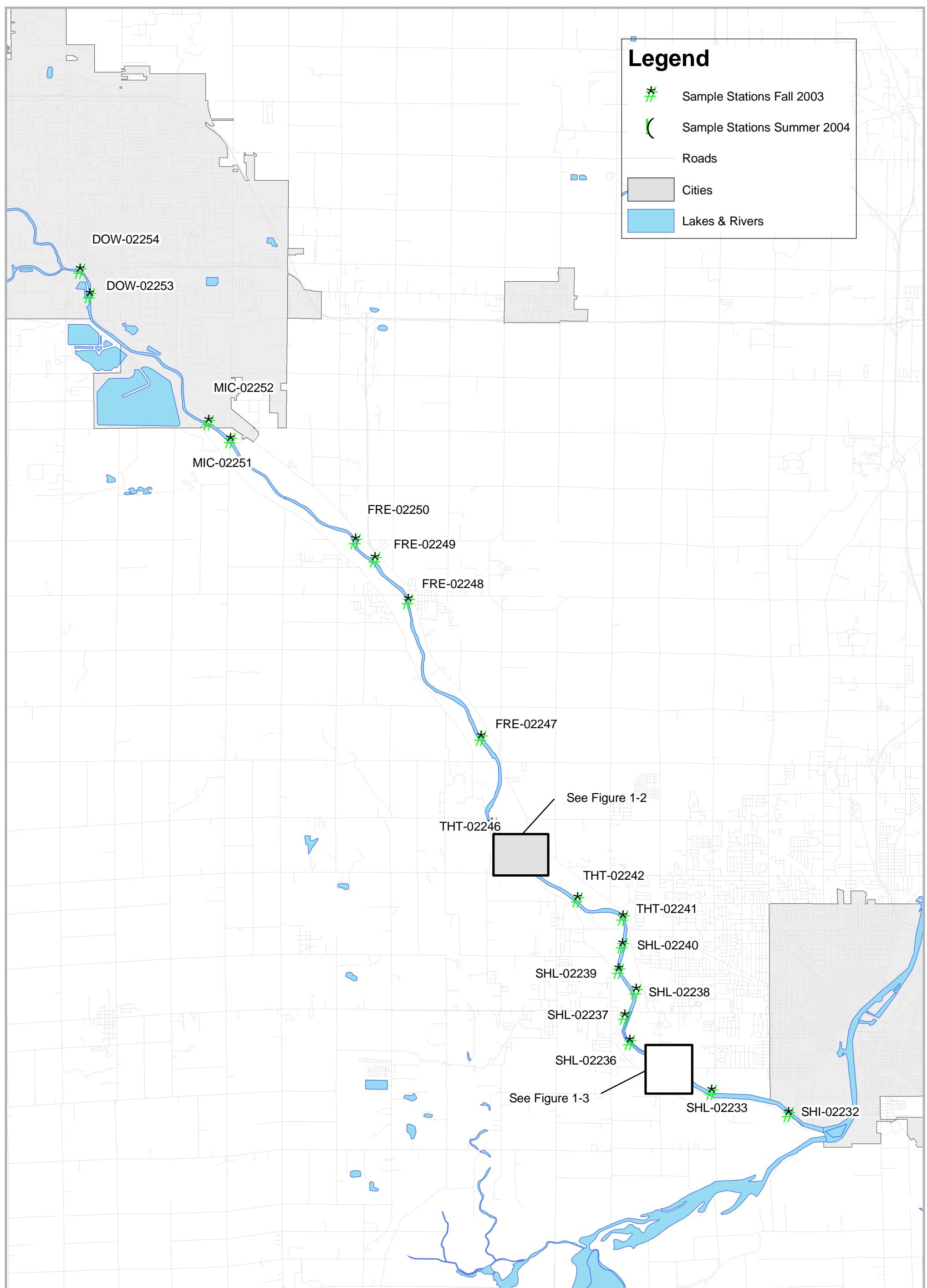
Dow Midland Offsite Corrective Action Program

<b>Station ID</b>	<b>Water Depth (ft)</b>	<b>Sediment Penetrated (ft)</b>	<b>Sediment Recovered (ft)</b>	<b>Percent Recovery</b>
THT-02780	0.7	4	2.3	58%
THT-02781	10.2	1.5	1.2	80%
THT-02782	3.75	4.25	3.95	93%
THT-02783	3.4	NR	3.15	-
THT-02784	NR	NR	3.55	-
THT-02785	2	2.5	1.8	72%
THT-02786	8	NR	1.5	-

NR – Not recorded

– Not calculated (penetration not recorded)

**Figure 1-1**  
**Existing Sediment Core Locations – 2003 Sampling Event**  
**8.5 x 11**



0 0.5 1 2 3 4 Miles

**FIGURE 1-1**  
Existing Sediment Core Locations - 2003 Sampling Event  
Tittabawasee River Sediment Core Vertical Characterization SAP  
Dow Midland Offsite Corrective Actions Program

**Figure 1-2**  
**Existing Sediment Core Locations – 2004 Cluster Sampling at THT02445**  
8.5 x 11

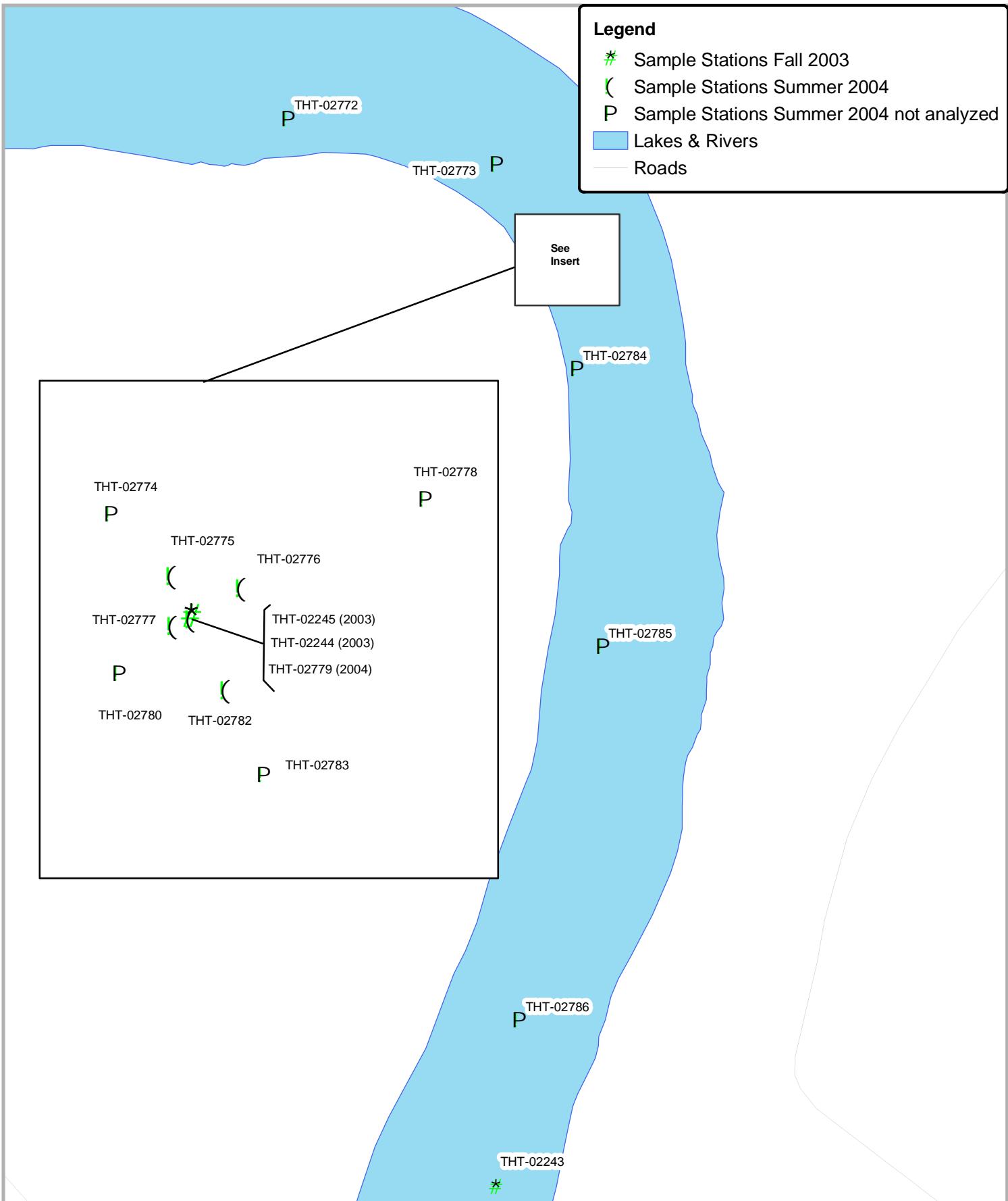
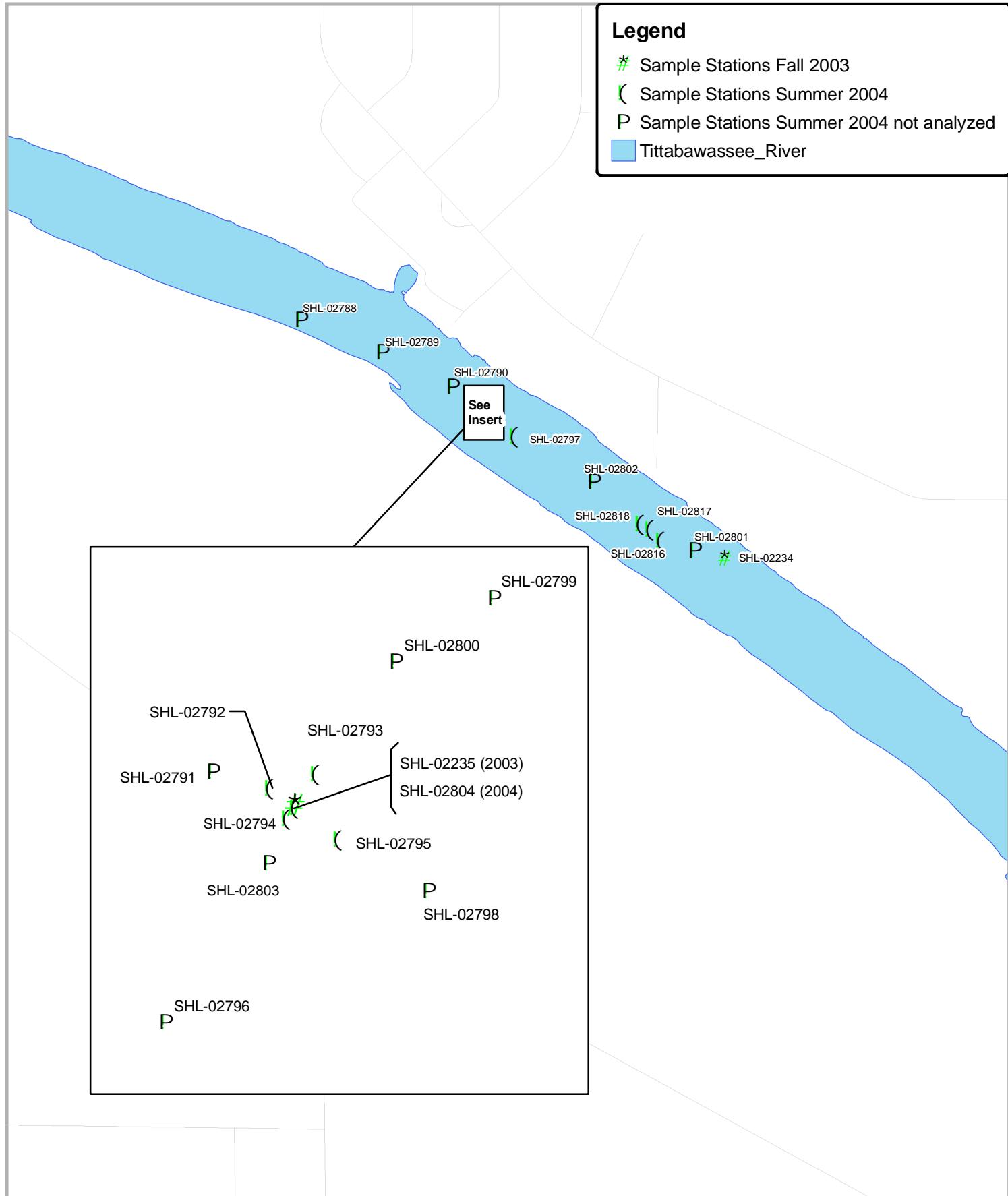


FIGURE 1-2  
Existing Sediment Core Locations 2004 Cluster Sampling at THT02445  
Tittabawassee River Sediment Core Vertical Characterization SAP  
Dow Midland Offsite Corrective Actions Program

**Figure 1-3**  
**Existing Sediment Core Locations – 2004 Cluster Sampling at SHL02235**  
8.5 x 11

### Legend

- # Sample Stations Fall 2003
- ( Sample Stations Summer 2004
- P Sample Stations Summer 2004 not analyzed
- Tittabawassee\_River



0 100 200 400 600 800 Feet

FIGURE 1-3  
Existing Sediment Core Locations 2004 Cluster Sampling at SHL02235  
Tittabawassee River Sediment Core Vertical Characterization SAP  
Dow Midland Offsite Corrective Actions Program

## **2 Investigation Approach and Sampling Design**

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This section presents the data quality objectives for core sampling and analysis, describes the plan for collecting sediment samples from the frozen cores, and identifies the analyses to be performed on the samples.

### **2.1 Data Quality Objectives**

The approach to investigation and data evaluation for the Tittabawassee River was determined using the U.S. Environmental Protection Agency (USEPA) seven-step DQO process (USEPA, 2000). Establishing DQOs is the first step in the design of an investigation plan to ensure that data are sufficient and of appropriate quality so that informed decisions can be made. The DQO process is also used to avoid collecting or using data that are inconsequential to decisionmaking and minimize expenditures during investigation by eliminating unnecessary or duplicative data.

The primary problem statement for the Tittabawassee River that will be addressed by this SAP is:

- What is the vertical distribution of dioxin and furan concentrations in river sediment?

The sampling program described in this SAP will evaluate the vertical distribution characteristics of dioxin and furan concentrations in the Tittabawassee River sediment to the extent feasible with the existing sample set.

### **2.2 Sampling Design**

Existing sample cores, collected under separate SAPs with different objectives are the source of the sediment to be used in the vertical characterization evaluation. Therefore, the design of the sampling programs with respect to sample location layout has already been established. The 2003 sediment cores were obtained at variable spacing and random locations across the river, consequently, they are likely to represent a reasonably well distributed cross section of sediment conditions at depth.

The 2004 sediment cores were collected at biased locations that centered around the two 2003 surface sediment samples with the highest TEQs in the data set. Many of the 2004 sample cores were obtained in very close proximity to the 2003 samples in order to better understand horizontal variability in surface sediment. This is not an objective for this sampling and analysis program, which is focused on the vertical distribution of dioxins and furans along the river. For the most part, cores collected in close proximity (that is, less than 100 feet) to the 2003 samples will not be included in the evaluation. However, one of the locations (THT-02445) happens to coincide with an inside curve of the river which has geomorphic features similar to a point bar where sediment is expected to accrete. Cores obtained around this location in 2004 may provide a better understanding of conditions in such a depositional environment and are therefore included in the evaluation.

With respect to the vertical element of design, the following intervals have been identified for dioxin and furan analysis:

- Surface Sediment - 0 to 0.3 ft
- Subsurface Sediment – bottom 1 ft of each core

The 0 to 0.3 ft interval was selected for analysis because it is considered the biologically active layer in the sediment. The surface sediment sample interval in each 2003 core has already been analyzed for dioxins and furans, but this interval was not sampled in some of the cores from the 2004 event. The bottom one foot subsurface sediment sample interval was selected because it will bracket the lowermost available interval of sediment. The intervening sediment between the surface and bottom of the core could be sampled at some time in the future if a more refined vertical characterization is needed. The sample intervals for each existing core are listed in Table 2-1. A total of 49 samples (14 surface sediment and 35 subsurface sediment samples) will be obtained for analysis.

## 2.3 Sample Collection and Analysis

To collect the samples for analysis, each core will be sectioned into the sample intervals listed in Table 2-1. A hacksaw will be used to cut through the frozen core liner. The sediment from each interval will then be extruded from the liner and placed into appropriate sample containers supplied by a laboratory (see Table 2-2) and be shipped for analysis. The sediment samples collected from each core will be analyzed for dioxins and furans (17 congeners) using SW-846 8290, grain size using ASTM D422, and TOC using SW-846 9060.

### 2.3.1 Sample Containers and Preservation

Sample container and preservation requirements are presented in Table 2-2. Additional sample container and preservation requirements are provided in the QAPP (CH2M HILL, 2004b).

### 2.3.2 Field Quality Control

Because this program is limited to use of sediment cores obtained during previous investigations, it is not possible to obtain additional volume for extensive field quality samples. Approximately two to three sample aliquots can be obtained from each foot of core. In accordance with Section 2.5 of the QAPP (CH2M HILL 2004b), every effort will be made to collect the field quality control samples at the following frequencies:

- Field duplicates will be collected at a minimum frequency of 1 per 10 samples (5 samples)
- Matrix spike/matrix spike duplicate at minimum frequency of 1 per 20 samples (3 samples).

### 2.3.3 Station/Sample Identification

The Station Identification numbers for all of the sample cores were generated at the time of initial sampling. Sample identification numbers will be generated upon Dow-approval of this sampling plan. Each individual sample will be assigned a unique identifier according to the *Sample Identification Technical Memorandum* (CH2M HILL, 2004c). Location and sample identification will be based on specific geographic area codes and record numbers assigned to samples from the Dow Midland data management program.

### **2.3.4 Sample Handling and Chain of Custody**

The procedures used for proper packaging, shipping, and documentation of samples being transported from the sample preparation facility to the laboratory for analysis are provided in the "Sample Handling and Shipping Custody Procedures" of the Field SOP (CH2M HILL, 2004a). After samples are labeled and packaged, they will be shipped to the appropriate labs for analysis.

Completed chain-of-custody forms will be required for all samples. The chain-of-custody form will contain the following for each sample:

- Identification number
- Date and time
- Description
- Type
- Preservation
- Analyses required

The original chain-of-custody form will accompany the samples to the laboratory. The forms will remain with the samples at all times. The samples and signed chain-of-custody forms will remain in the possession of the sampling crew until the samples are delivered to the express carrier.

### **2.3.5 Equipment Decontamination**

Personal decontamination procedures will be those provided in the *Dow MOCA Health, Safety, and Environment Plan* (CH2M HILL, 2003). Excess sediment, disposable sample handling equipment, and decontamination materials and liquids will be disposed of in accordance with the "Handling and Disposal of Investigative-derived Waste" of the Field SOP (CH2M HILL 2004a).

**Table 2-1**  
**Proposed Sampling Program**  
Tittabawassee River Sediment Core Vertical Characterization Sampling and Analysis Plan  
Dow Midland Offsite Corrective Action Program

<b>Station ID</b>	<b>Sediment Recovered (ft)</b>	<b>Event</b>	<b>Previously Sampled Interval (feet)</b>	<b>Proposed Sample Interval (feet)</b>
DOW-02253	3.67	2003	0 to 0.3	2.67 to 3.67
DOW-02254	3	2003	0 to 0.3	2 to 3
FRE-02247	3.5	2003	0 to 0.3	2.5 to 3.5
FRE-02248	2.42	2003	0 to 0.3	1.42 to 2.42
FRE-02249	3	2003	0 to 0.3	2 to 3
FRE-02250	3	2003	0 to 0.3	2 to 3
MIC-02251	1.58	2003	0 to 0.3	0.58 to 1.58
MIC-02252	4	2003	0 to 0.3	3 to 4
SHI-02232	1.8	2003	0 to 0.3	0.8 to 1.8
SHL-02233	2.3	2003	0 to 0.3	1.3 to 2.3
SHL-02234	3.9	2003	0 to 0.3	2.9 to 3.9
SHL-02235	3	2003	0 to 0.3	2 to 3
SHL-02236	3.8	2003	0 to 0.3	2.8 to 3.8
SHL-02237	3	2003	0 to 0.3	2 to 3
SHL-02238	3	2003	0 to 0.3	2 to 3
SHL-02239	3.4	2003	0 to 0.3	2.4 to 3.4
SHL-02240	0.8	2003	0 to 0.3	Insufficient core to sample
SHL-02788	2.4	2004	NA	0 to 0.3, 1.4 to 2.4
SHL-02789	2	2004	NA	0 to 0.3, 1 to 2
SHL-02790	5	2004	NA	0 to 0.3, 4 to 5
SHL-02797	3.6	2004	NA	0 to 0.3, 2.6 to 3.6
SHL-02801	3.25	2004	NA	0 to 0.3, 2.25 to 3.25
SHL-02802	2.75	2004	NA	0 to 0.3, 1.75 to 2.75
SHL-02817	3	2004	NA	0 to 0.3, 2 to 3
THT-02241	4.1	2003	0 to 0.3	3.1 to 4.1
THT-02242	2.25	2003	0 to 0.3	1.25 to 2.25
THT-02243	1.58	2003	0 to 0.3	0.58 to 1.58

**Table 2-1**

**Proposed Sampling Program**

Tittabawassee River Sediment Core Vertical Characterization Sampling and Analysis Plan  
Dow Midland Offsite Corrective Action Program

<b>Station ID</b>	<b>Sediment Recovered (ft)</b>	<b>Event</b>	<b>Previously Sampled Interval (feet)</b>	<b>Proposed Sample Interval (feet)</b>
THT-02244	2.3	2003	0 to 0.3	1.3 to 2.3
THT-02246	1.3	2003	0 to 0.3	0.3 to 1.3
THT-02772	4	2004	NA	0 to 0.3, 3 to 4
THT-02773	4.9	2004	NA	0 to 0.3, 3.9 to 4.9
THT-02774	2.85	2004	NA	0 to 0.3, 1.85 to 2.85
THT-02783	3.4	2004	NA	0 to 0.3, 2.4 to 3.4
THT-02784	3.55	2004	NA	0 to 0.3, 2.55 to 3.55
THT-02785	1.8	2004	NA	0 to 0.3, 0.8 to 1.8
THT-02786	1.5	2004	NA	0 to 0.3, 0.5 to 1.5

NA = Interval sampled previously

TABLE 2-2

Required Analytical Method, Sample Containers, Preservation, and Holding Times  
*Tittabawasee River Sediment Core Vertical Characterization Sampling and Analysis Plan*  
*Dow Midland Offsite Corrective Action Program*

Analyses	Preparatory / Analytical Method	Sample Matrix <sup>a</sup>	Container <sup>b</sup>	Qty	Preservative <sup>c</sup>	Holding Time <sup>d</sup>
Total Organic Carbon (TOC)	EPA 415.1/SW-846 9060	S	4-oz glass	1	Cool 4°C	28 days
Dioxins/Furans	SW-846 8290/ EPA 1613	S	8-oz glass	1	Cool 4°C	30/45 days
Grain Size	ASTM D422	S	8-oz glass	1	None	NA

## Notes:

Sample containers and volume requirements will be specified by the analytical laboratory performing the tests.

<sup>a</sup>Sample matrix: S = surface soil, subsurface soil, sediment

<sup>b</sup>All containers will be sealed with Teflon®-lined screw caps.

<sup>c</sup>All samples will be stored promptly at 4°C in an insulated chest.

<sup>d</sup>Holding times are from the time of sample collection.

Source: SW-846, third edition, Update III (June 1997).

oz = Ounce

EPA = U.S. Environmental Protection Agency

NA = Not applicable

ASTM = American Society for Testing and Materials

# **3 Data Evaluation**

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The results of the vertical characterization sampling effort will be evaluated by comparing individual TEQ results for each core interval to each other, by preparing graphical displays such as cross sections that depict changes in TEQ concentrations at depth along the length of the river and at transects across the river, and by evaluating depth intervals by group throughout the study area and within clustered sample locations. Several statistical techniques, including geostatistics and nested analysis of variance (ANOVA) may be used to determine whether trends related to depth, location, or geomorphic feature can be ascertained from the data set.

## **3.1.1 Geostatistics**

Geostatistics is a set of statistical procedures that is designed to assess the spatial relationships among samples collected from different locations and use those relationships in estimating contaminant concentrations in unsampled areas. The first step in the geostatistical evaluation is the construction of a semivariogram using the initial sampling data. The semivariogram is used to determine the typical separation distance between and orientation of sampled locations that delineate uncorrelated data.

## **3.1.2 Analysis of Variance**

ANOVA is a standard statistical technique to determine differences among populations or subgroups of interest. The method relies on differences in variance both across and within subpopulations of interest. “Nested ANOVA” refers to the overlapping sources of variability in the data, each of which is part of the variability in the levels above. In the sediment vertical characterization study, sources of variability include the following:

- Laboratory measurements (as estimated by laboratory duplicate results)
- Variability in concentrations (as estimated by clustered and vertically adjacent samples)
- Larger-scale variability in concentrations among sampled areas (as estimated by samples collected from different depths and different parts of the river).

The results of the ANOVA will provide information on statistical differences between contaminant concentrations in subgroups of interest in the sediment (e.g., statistical difference between concentrations in a certain interval or locations versus concentrations in a different interval or location). This information related to contaminant distributions will be used to refine the conceptual site model.

## 4 Data Management and Validation

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All data collected under this SAP will be managed in accordance with the QAPP (CH2M HILL, 2004b). As specified in the QAPP, all analytical data generated to support the Dow MOCA program will be validated. Ten percent of the data packages will be validated to Level IV by a third-party subcontractor to CH2M HILL. All other data packages will be validated to Level III by the CH2M HILL project chemist (or designee). Following validation, data will be entered into a central database. The data will then be accessible for evaluation, interpretation, and reporting activities.

## **5 Health and Safety**

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A site-specific amendment to the Health, Safety and Environmental Plan will be prepared for this project and will be approved by the Health and Safety Manager. Prior to beginning sampling work, field team members must read and sign the amendment, and follow its requirements.

## 6 References

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- CH2M HILL. 2003. *Dow MOCA Health, Safety, and Environment Plan*. December.
- CH2M HILL. 2004a. *Field Standard Operating Procedures*. April.
- CH2M HILL. 2004b. *Quality Assurance Project Plan*. April.
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- CH2M HILL. 2004d. *Tittabawassee River Dioxin/Furan Concentration Variability*. November.
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- Michigan Department of Environmental Quality (MDEQ). 2003. *Hazardous Waste Management Facility Operating License for The Dow Chemical Company Midland Plant*. June 12.
- U.S. Environmental Protection Agency (USEPA). 2000. "Guidance for the Data Quality Objectives Process (EPA QA/G-4)." *EPA Guidance Document EPA/600/R-96/055*. August.